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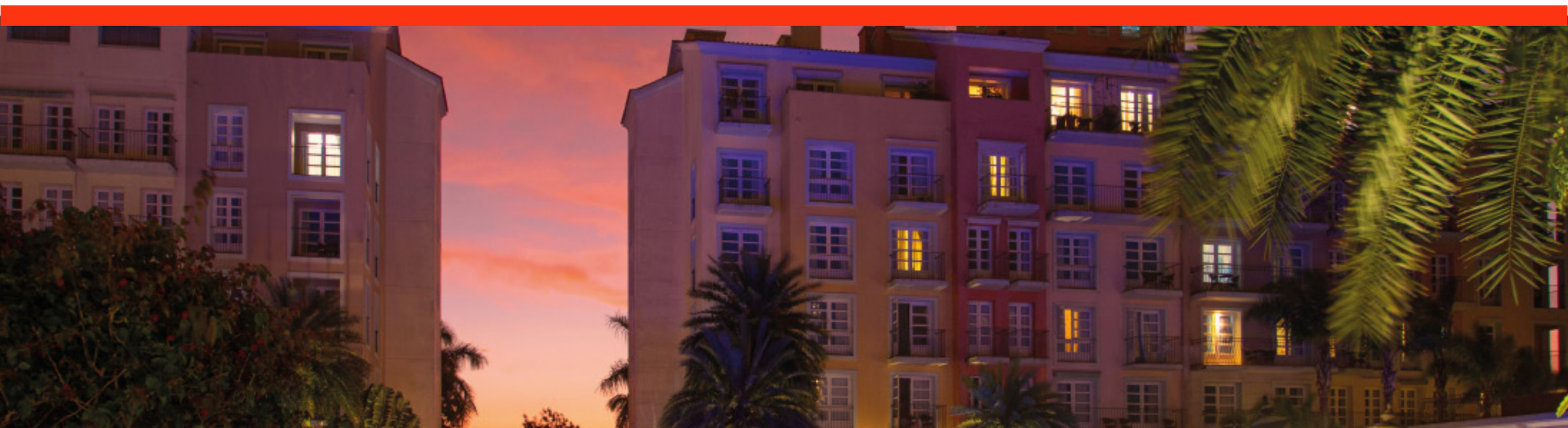
SBENF
Sociedade Brasileira de Esteriotaxia
e Neurocirurgia Funcional

16º CBENF
Congresso Brasileiro
de Estereotaxia e
Neurocirurgia Funcional

1º a 4 de maio de 2024 | Florianópolis-SC

ABSTRACTS COMPENDIUM

E-BOOK



Conectando gerações e experiências!

A 16ª edição do CBENF, realizado em Florianópolis cumpriu sua missão com grande êxito!

Reuniu mentes brilhantes da neurocirurgia funcional brasileira e internacional, bateu recorde de inscrições e captação de patrocínios, apresentou tecnologias de ponta e confraternizou os membros da SBENF com intensidade.

A programação foi recheada de experiências inovadoras que certamente ficarão marcadas na história da nossa sociedade. Com destaque para a programação científica, caracterizada pelo protagonismo dedicado ao amplo espaço de debate entre todos. Por isso fizemos questão de registrar a modernidade dos temas escolhidos e os membros das sessões neste material.

No coração deste e-book reunimos a produção científica apresentada no evento na modalidade trabalhos científicos aprovados, cujo destaque está na altíssima qualidade apresentada.

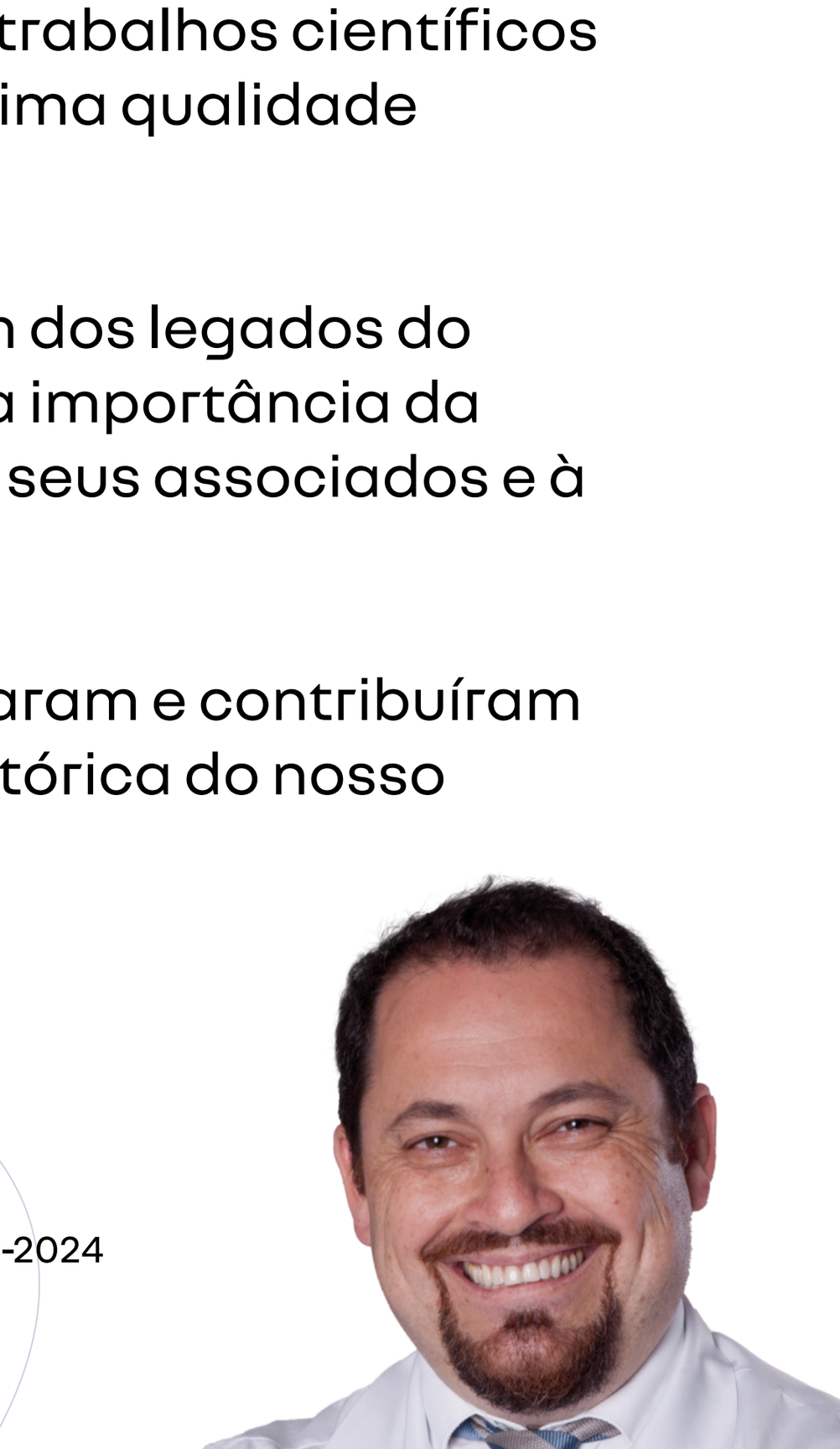
Esperamos que esta publicação seja um dos legados do CBENF Floripa 2024 a você, reforçando a importância da contribuição dos eventos da SBENF aos seus associados e à neurocirurgia brasileira.

Por fim, agradecemos a todos que apoiaram e contribuíram para o imenso sucesso desta edição histórica do nosso congresso.

Forte Abraço,

Dr. Wuilker Knoner Campos

Presidente do 16º CBENF Floripa 2024 e da SBENF Gestão 2023-2024



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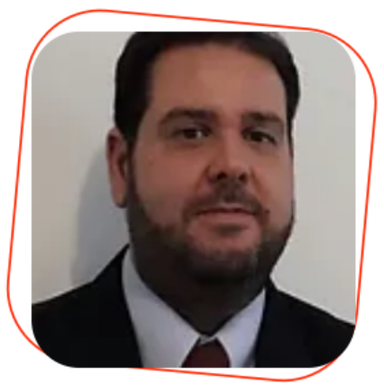
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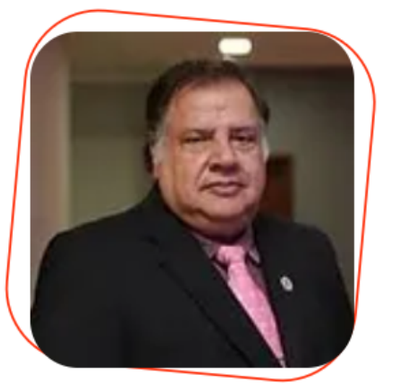
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7 Simpósios Satélites

11 Patrocinadores de Alta Relevância no Mercado

7 Stands com 131 Expositores

88 Palestrantes Nacionais

241 Inscritos

2 Cursos de capacitação Pós-Congresso

17 Palestrantes Internacionais

357 Pessoas Participando



ENFOQUE CIENTÍFICO

Tema do Evento

PREDITORES POSITIVOS

Conectividade entre neurotecnologia e experiência clínica

SUB-EIXOS TEMÁTICOS

Dor

Distúrbio Movimento

Epilepsia

Espasticidade

Cirurgia do Comportamento

Radiocirurgia

Inovação

MESAS CIENTÍFICAS

PANEL 1: Movement Disorders



Host: Vanessa Milanese
Moderator: Erich Fonoff e Carlos Rocha

▪ **Keynote Lecture:** International Conference
- SRS For Tremor in the Era of DBS and FUS?
- Dr. Michael Shulder

▪ **Point of View 1:** Network based treatment for Movement Disorders
- Andreas Horn

▪ **Point of View 2:** Potential for neuroprotection in Deep Brain Stimulation for Parkinson's Disease
- Suneil Kalia

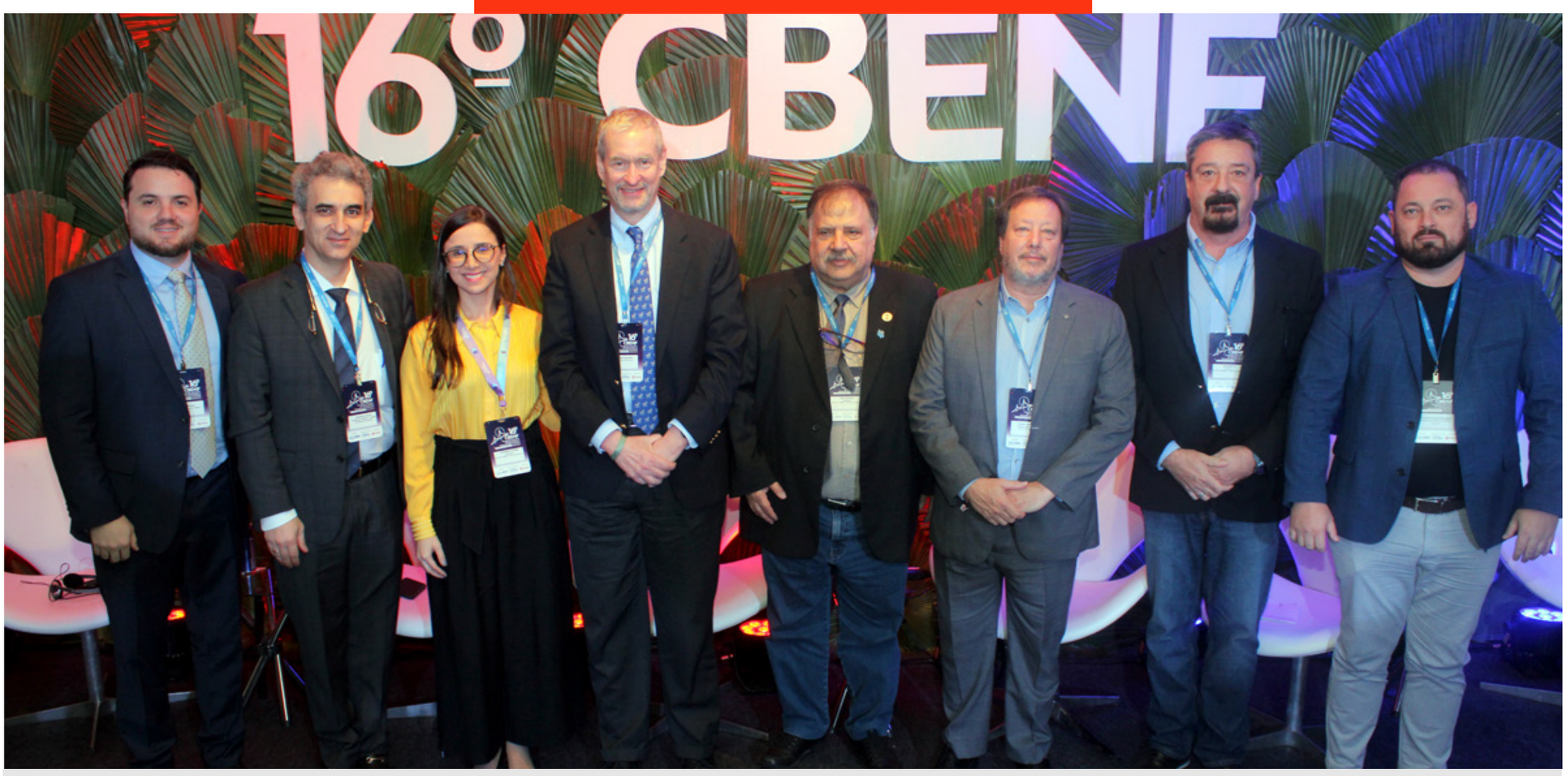
▪ **Point of View 3:** Importance of target and trajectory in GPi DBS and Pallidotomy for Parkinson's disease
- Paulo T. Brainer Lima

▪ **Point of View 4:** FOG in PSP. What can we do?
-Fabian Piedimonte

▪ **Discussion**

MESAS CIENTÍFICAS

PANEL 2: Pain Surgery



Host: Wuilker Knoner Campos
Moderator: Pablo Fruett e Arthur Ungaretti Jr

- **Keynote Lecture:** International Conference: Neuromodulation for Neuropathic Facial Pain
- Konstantin Slavin

- **Point of View 1:** Effects of tonic or burst stimulation in invasive motor cortex stimulation for facial pain
- Catarina Couras

- **Point of View 2:** Cordotomy or mesencephalotomy to relieve lateralized cancer pain?
- José Oswaldo de Oliveira Junior

- **Point of View 3:** Radiosurgery For Trigeminal Neuralgia— How Many Times?
- Dr. Michael Shulder

- **Point of View 4:** Multitarget stimulation for cluster heachache. Could it be an option to be considered?
-Fabian Piedimonte

- **Discussion**

MESAS CIENTÍFICAS

PANEL 3: Epilepsy



Host: Leila da Roz
Moderator: Ricardo Centeno e Arthur Cukiert

▪ **Keynote Lecture:** International Conference:
Novel Robotic devices for the treatment of epilepsy
- Joseph Neimat

▪ **Point of View 1:** Neuromodulation in epilepsy:
How to choose the best targets?
- Tatiana Von Hertwig

▪ **Point of View 2:** Has SEEG replaced subdural grids
in invasive monitoring of epileptic seizures
involving eloquent cortical areas?
- Marcelo Volpon

▪ **Point of View 3:** When would radiosurgery be my first
option for treating refractory epilepsy?
- Antonio de Salles

▪ **Point of View 4:** Refractory Epilepsy in eloquent
areas: is there a role for Neuromodulation?
-Ashwini Sharan

▪ **Discussion**

MESAS CIENTÍFICAS

PANEL 4: Innovation



Host: Adriana Libório
Moderator: Julio Lustosa e Leonardo Frighetto

- **Keynote Lecture:** International Conference: Focused ultrasound-mediated drug delivery through the blood-brain barrier
- Clement Hamani

- **Point of View 1:** Novel brain stimulation devices powered by low-energy Ultrasound
- Joseph Neimat

- **Point of View 2:** Wearable Devices for movement disorders symptom evaluation
- Bruno Lima

- **Discussion**

MESAS CIENTÍFICAS

PANEL 5: Pain Surgery



Host: Eliseu Becco
Moderator: Alessandra de M. Lima e Gilberto Fonseca

▪ **Keynote Lecture:** International Conference: Indication algorithm for Spinal Cord Stimulation
- Ashwini Sharan

▪ **Point of View 1:** Should imaging of disc protrusion contraindicate radiofrequency neurotomy of medial branches in axial pain?
- Daniel Benzecry de Almeida

▪ **Point of View 2:** Possible rescues over tolerance in Spinal Cord Stimulation
- Alexandre do Amaral

▪ **Point of View 3:** What to do when the patient consumes opioids throught other means than those released by the implanted pump?
- Carla Ceres

▪ **Discussion**

MESAS CIENTÍFICAS

PANEL 6: Movement Disorders



Host: Juliana Zuiane
Moderator: Erich Fonoff e Raquel Brant

- **Keynote Lecture:** International Conference: New era of biological treatments for PD
- Suneil Kalia

- **Point of View 1:** Adaptive Deep Brain Stimulation: The future of neuromodulation
- Kelly D. Foote

- **Point of View 2:** Clinical Insights of motor and non-motor effects of GPI and STN DBS
- Maria Gabriela Ghilardi

- **Point of View 3:** Scientific evidences and clinical Insights in SCS as a treatment for FOG
- Carolina Souza

- **Point of View 4:** Image guided Image verified DBS
- Harith Akram

- **Discussion**

MESAS CIENTÍFICAS

PANEL 7: Psychiatric Neurosurgery



Host: Lissa Goulart
Moderator: Paulo Franceschini e Tiago Freitas

▪ **Keynote Lecture:** Connectome based Deep Brain Stimulation for Obsessive Compulsive Disorder and Depression
- Andreas Horn

▪ **Point of View 1:** Deep Brain stimulation for treatment-resistant depression: Positive Predictors
- João Quevedo

▪ **Point of View 2:** Modified Limbic Leucotomy for Depression
- Osvaldo Vilela

▪ **Point of View 3:** Ablative surgery for aggression: Targets of choice
- Rodrigo Labruna

▪ **Point of View 4:** DBS for aggression: Positive Predictors
- William Contreras

▪ **Discussion**

MESAS CIENTÍFICAS

PANEL 8: Spasticity And Motor Recovery



Host: Eduardo Quaggio
Moderator: Fabio Okuda e Hougelle Simplicio

▪ **Keynote Lecture:** International Conference: Spinal Cord Stimulation for Motor Improvement
- Kendall Lee

▪ **Point of View 1:** Brain-Machine Interface for Rehabilitation in Spinal cord Injury
- Eduardo Alho

▪ **Point of View 2:** DREZotomy and Surgical Treatment of Pain and Spasticity
- Alexandre Novicki Francisco

▪ **Point of View 3:** Closed loop stimulation for motor rehabilitation in spinal cord injury
- Caio Matias

▪ **Discussion**

MESAS CIENTÍFICAS

PANEL 9: Psychiatric Neurosurgery



Host: Natally Santiago
Moderator: Marcello Penholate e Alexandre Reis

▪ **Keynote Lecture:** International Conference: Closed loop DBS for Pathological Binge Eating: A potential answer for addictive behavior
- Kelly D. Foote

▪ **Point of View 1:** Emerging Therapies for Psychiatric Deep Brain Stimulation
- Kendall Lee

▪ **Point of View 2:** Positive Predictors for DBS in depression
- Clement Hamani

▪ **Point of View 3:** 50 years of GK anterior capsulotomy for OCD: predictors for future refinements
- Alessandra Gorgulho

▪ **Point of View 4:** Vagus Nerve Stimulation for treatment-resistant depression
- João Quevedo

· **Discussion**

MESAS CIENTÍFICAS

PANEL 10: Innovation



Host: Francinaldo Gomes
Moderator: Gustavo Lages e Antônio Nogueira

▪ **Keynote Lecture:** International Conference: Connectivity guided neurosurgery
- Harith Akram

▪ **Point of View 1:** DBS for Addiction
- Kristen M Scheitler

▪ **Point of View 2:** Insular Deep Brain Stimulation for Chronic Pain
- Nilton Alves Lara Jr.

▪ **Point of View 3:** Sweet Spot Deep Brain Stimulation for Tremor Predicting Outcomes
Vanessa Milanese

▪ **Point of View 4:** The return of ablation techniques in neurosurgery for psychiatric disorders
- Julian Soto

· **Discussion**

+ DE 40

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TRABALHOS APROVADOS

Sub-eixo temático:

Dor



16º CBENF
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Código.: 4DMB

Headache due to Cerebrospinal Fluid Hypotension Resulting from the Formation of an Anterior Cervical Liquor Fistula after Chiropractic Manipulation:

Franklin reis [1,2], Isabelle Neitzel Kuck Lopes [3], Maria Luiza Rodrigues Sales dos Reis [4], Marcelo Daison Conrad [5], Renata de Angeli Corredato [5], Wuilker Knoner Campos [5]

[1] Faculdade Brasileira de Recursos Humanos (*Sbn*), [2] Sos cardio (*Neurocirurgia*), [3] Universidade Federal do Amazonas (*neurologia*), [4] Universidade Federal do Acre (*neurologia*), [5] Sos cardio (*neurocirurgia*)

e-mail: franklindfreis@gmail.com

Case Presentation:

A female patient with chronic axial neck pain presented with intense headache following a cervical chiropractic session. The headache was characterized by its intensity, resistance to common analgesics and anti-inflammatories, a 10/10 rating on the numeric verbal scale, holocranial location, squeezing sensation, continuous and progressive nature. A distinctive feature was the exacerbation of symptoms while sitting or standing, with the absence of pain when lying down, consistent with clinical features of orthostatic headache due to cerebrospinal fluid hypotension.

She sought emergency care, where a cervical spine magnetic resonance imaging (MRI) was performed, revealing a collection suggestive of epidural hematoma in the anterior region, with larger volumes between C7 and T2, without signs of compression or stenosis of the vertebral canal segments. Conservative treatment was administered, leading to a successful outcome without complications.

Discussion:

Chiropractic therapy, involving manual adjustments primarily targeting spinal issues, is a widely used method for treating chronic and acute pain. It contributes to the multidisciplinary approach in pain management. Orthostatic headache due to cerebrospinal fluid hypotension is well-documented, with clear criteria from the International Headache Society, including the appearance of cerebrospinal fluid fistula on imaging and the temporal relationship with the clinical history.

Final Remarks:

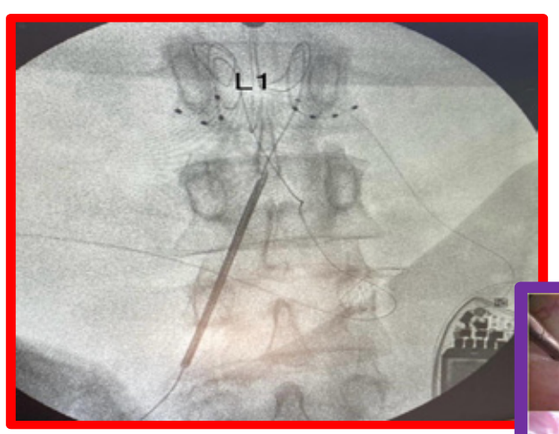
The patient reported that the pain started on the same day, hours after chiropractic manipulation, suggesting a temporal association between the therapy and the development
of the epidural collection, altering intracranial pressure and causing symptoms. Additionally, spontaneous cervical cerebrospinal fluid fistulas are less common than rhinogenic ones, characterizing this case as spontaneous, without any history of physical, surgical, or non-surgical trauma. This underscores the importance of seeking qualified professionals for all procedures, especially those involving the central or peripheral nervous system.

Código.: 4DMJ

CASE REPORT: NEUROSTIMULATION OF THE GRD IN A PATIENT WITH CRPS TYPE I DUE TO RIGHT ANKLE FRACTURE AND PELVIC PAIN AFTER CESAREAN SURGERY

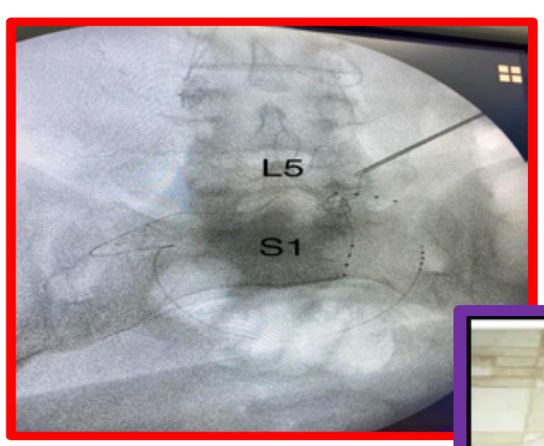
Miranda C C V , Jr Alves N L
Centro médico Rio Branco Neurocirurgia funcional,[1] São José dos Campos SP
HFMUSP [2] São Paulo SP
email: ceresvillas@gmail.com

Female J .R .S .L, 40 years old, with a history of right ankle fracture and fixation surgery in 2008, evolving with CRPS. He presented trophic changes in the skin on his right foot with edema, redness, increased sweating with intense pain and allodynia. Referred to a pain clinic in 2009 where conservative treatment was instituted. Drug therapy on the WHO Analgesic Ladder was started on the 2nd step, and within 1 month reaching the 3rd step with strong opioids and adjuvants due to no satisfactory response. Physiotherapy treatment has continued since the beginning of treatment.The patient remained with EVN 8/9 and limitation of common activities of daily living. Analgesic and neurolytic lumbar sympathetic nervous system blockade was performed with effectiveness around 50% EVN 4/5. Several attempts were made to obtain authorization from the patient's insurance to implant a spinal cord stimulation electrode, which was achieved in 2012. The implant was performed with a 4-pole electrode placed with the tip at the level of the upper plateau of T11 with full mapping the area of pain. The patient achieved an excellent result with EVN 1 and resolution of the trophic changes in the skin.In 2015, she underwent emergency cesarean surgery at 8 months of pregnancy, having complications, as they were not known to her until then. At the time, she was still using methadone, pregabalin and amitriptyline, which also led to complications with the child.After giving birth, she started having pelvic pain and a diagnosis of endometriosis was made, where she underwent endometrioma surgery outside the uterine region in 2022. The patient continued to have pain in her left flank, which became chronic and was also unresponsive to treatment with oral analgesia and EVN 9 .During this period, the battery of the neurostimulation system was found to have ended (2018) but the patient continued to use opioids and did not attend the clinic until 2023. The pain in the right lower limb returned and she even had edema and redness.Therefore, it was recommended to implant electrodes in the dorsal root ganglia of bilateral L1 and right L5 and S1 in order to solve the two pains together with the use of a single generator.



L1 bilateral
Dor pélvica





L5 e S1 direitos
SDRC no pé direito



Discussion

The implantation of a spinal electrode for neuropathic and nociceptive pain has an effectiveness equal to or greater than 50%, offering the patient a return to their activities and improving their quality of life. DRG stimulation came to optimize the effectiveness of neurostimulation in some painful pathologies such as CPRS, phantom limb pain, injury or disease of the peripheral nervous system, and others in which there is difficulty in mapping the more localized affected region with failure in both the production of paresthesias and consequent insufficiency of therapy.
The dorsal root ganglion is a structure that not only connects the peripheral nervous system to the central nervous system, but also has an important regulatory function in the transmission and modulation of pain. It has direct action on the nociception process through the detection and manufacture of modulating molecules.
The DRG has a direct contribution to the development of neuropathic pain through hyperexcitability and spontaneous ectopic activity in cell bodies after nerve injury.
DRG stimulation would stabilize vasodilation, neuronal hyperexcitation, and ectopic activity, acting on Na channels, causing down-regulation and up-regulation of K channels, in addition to restoring Ca channels. the decrease in the excitability of WDR neurons in the posterior horn of the medulla and reducing the release of pro-inflammatory substances and cytokines with stabilization of microglia, etc.
Stimulation of the dorsal root ganglia correlated to the dermatomes affected by pain may provide greater relief.
Studies show evidence of I for CPRS and III for somatic or visceral pelvic pain
(NACC- neuromodulation appropriateness consensus committee on best practices for DRG stimulation).

Final comments

The choice of DRG stimulation in the case of the patient in question had 2 objectives: the first was the concomitance of two chronic pains that could be treated with DRG stimulation using only one pulse generator. If we exchanged the old pulse generator without battery for a new one and if we placed a new implant (SCS or DRG) for pelvic pain, we would have to use two devices , which would certainly be more uncomfortable for the patient. The patient's follow-up over these 3 months shows excellent results with regression of vasodilation, pain and allodynia of the right lower limb, as well as suppression of pelvic pain. EVN : 0 . The removal of the electrode plate at the patient's choice will be carried out as soon as the patient's endometriosis treatment is under control.

Código.: 4DMM

SPINAL PROCESS SPLITTING LAMINOTOMY (SPSL): A MINIMALLY INVASIVE APPROACH FOR SPINAL CORD STIMULATION

Kuriki, Breno H.[1]; Vanessa M.S.[1]; Taisa A.A.F.[1]; Luan V.A.C.[1]; Carlos E.L.R.[1]; Thania R.[1]; Marco A.S.S.V.[1]
[1]Centro Universitário São Camilo, São Paulo – SP.
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We present a case of a pioneering minimally invasive spine access for spinal cord stimulation leads placement. The complexity of the patient's medical history and clinical presentation incited the consideration for implementing this procedure.

A 58-year-old female with chronic neuropathic pain refractory to analgesics sought out a definitive solution to her clinical condition. A laminectomy in 2010 resulted in a dural sac lesion and unsatisfied pain control, which prompted a subsequent arthrodesis in 2011. This second approach was insufficient in subsidizing the neuralgia and served only to additionally lower the quality of life, illustrated through a VAS score of 8 for both lumbar and right lower limb pain.

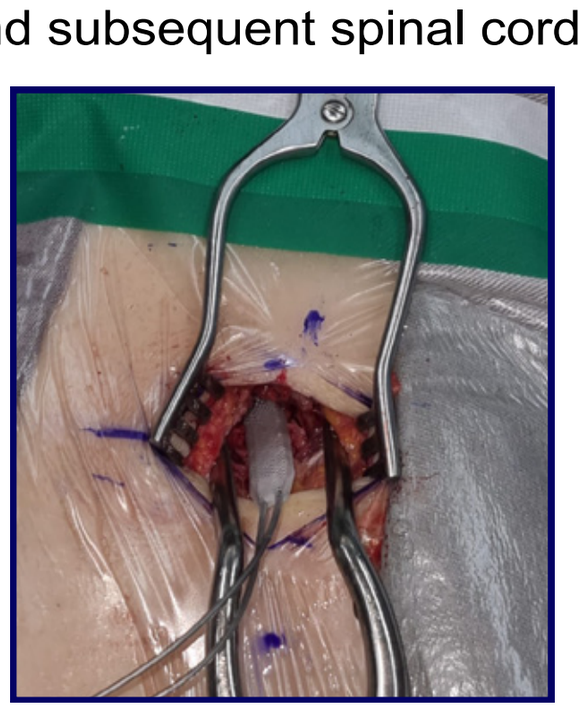
The patient’s neuropathy could be characterized as dysesthesia, burning sensation, and hypoesthesia on the lumbar and lower right limb, associated with a dorsiflexion deficit of the right foot and hallux, thus suggesting a sciatic nerve compression with pathological gait. Despite chronic use of duloxetine, cyclobenzaprine, gabapentin, and tramadol, there seemed to be no reduction of pain symptoms.

A thorough investigation ensued. An eletromyoneurography done in 2016 documented a chronic multiple radiculopathy with greater involvement of the L5 segment. A spine CT scan in May of 2022 showed that the previous arthrodesis of the L3-L4, L4-L5, and L5-S1 segments had no critical spine canal stenosis associated. Still, in the same year, an MRI brought to light spondyloarthropathy images concordant with the previously described arthrodesis.

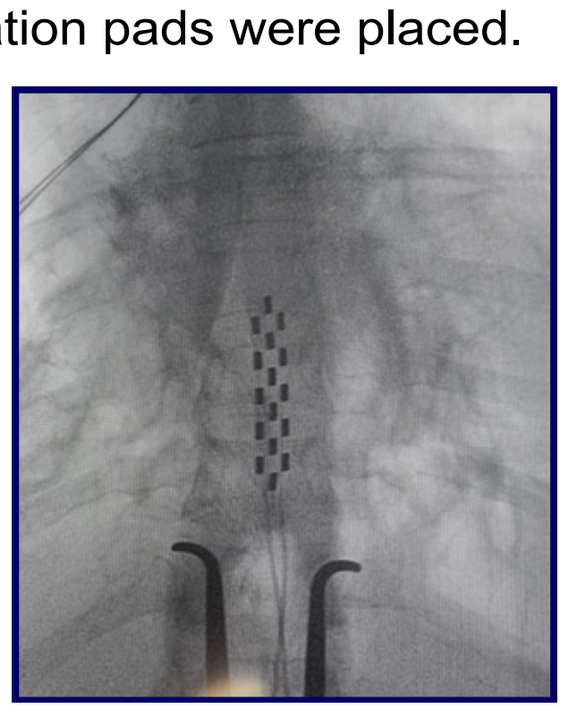
Studies on the SPSL show a lower incidence of paraspinal muscle damage and muscle atrophy when compared to the midline laminotomy technique. Additionally, there’s minimal retraction of muscular and ligamentous structures, lowering postoperative pain and hospital stay, further reducing complications while enabling an earlier mobilization and recovery. Implementing SPSL was considered due to these properties, and subsequent spinal cord stimulation pads were placed.



a) Spinal access after the SPSL



b) Leads pad placement through the spinal access



c) Intraoperative imaging, confirming the correct placement

The postoperative follow-up included the programming of stimulation pads and clinical assessment tests, resulting in a significant decrease in reported pain and need for analgesics after only 2 weeks.

This case report illustrates the potential benefit of this less invasive technique when correctly indicated, such as refractory lumbar radiculopathy with previous ineffective surgical approaches, highlighting lower morbidity and better postoperative recovery.

REFERENCES:

Thissen J, Bara GA. Placement of Surgical Spinal Cord Stimulation Leads Using Spinal Process Splitting Laminotomy: Technical Note. World Neurosurg. 2021 Nov; 155:109-114. Available from: https://doi.org/10.1016/j.wneu.2021.07.146

Código.: 4DMZ

Chronic pain, disability and depression in patients with Parkinson's disease selected for DBS implantation

Maria Eduarda Freire Lopes Senior; Álvaro Romero Diaz; Guilherme Freitas Parra; Hannah Ferreira Machado Videira; Mariana Spitz; Diogo Matheus Terrana de Carvalho; Bárbara Panichelli; Flávio Nigri; Elington Lannes Simões; Nivaldo Ribeiro Villela; Maud Parise.

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INTRODUCTION

Parkinson's disease (PD) is a chronic neurodegenerative condition leading to motor symptoms as bradykinesia, rigidity, and tremor. Non-motor symptoms like pain or mood disorders are a frequent complaint.

OBJECTIVES

To evaluate the impact of chronic pain and mood on daily activities considering age, pain intensity, and relief provided by medications in PD patients

METHODS

This is a pilot-study conducted in patients diagnosed with idiopathic PD selected for deep brain stimulation (DBS) implantation. The Brief Pain Inventory (BPI) and the Hospital Anxiety and Depression Scale (HADS) were used, with anxiety considered for scores ≥9 on the HADS-A and depression for scores ≥9 on the HADS-D.

RESULTS

Fourteen patients (6 men, 8 women) with a mean age of 61.8 ± 6.9 years were evaluated. The median depression score was 6.5 (IQR 5, 9) and the median anxiety score was 10 (IQR 5, 11). 14.2% of patients had no pain or had mild pain, 64.2% had moderate pain, and 21.4% considered their pain to be intense. Medications provided little relief in 28.57%, moderate relief in 42.86%, and significant relief in 28.57% of patients. The mean disability caused by pain was 2.9 ± 1.8, although 64.2% of patients reported moderate to severe interference with walking and sleep. Furthermore, pain intensity scores were positively related to HADS-D scores (r=0.66, p=0.010) Fig. 1, as were interference scores, which were also positively related to depression (r=0.70, p=0.006) Fig. 2. There was no association between pain intensity and interference scores with anxiety scores (HADS-A).

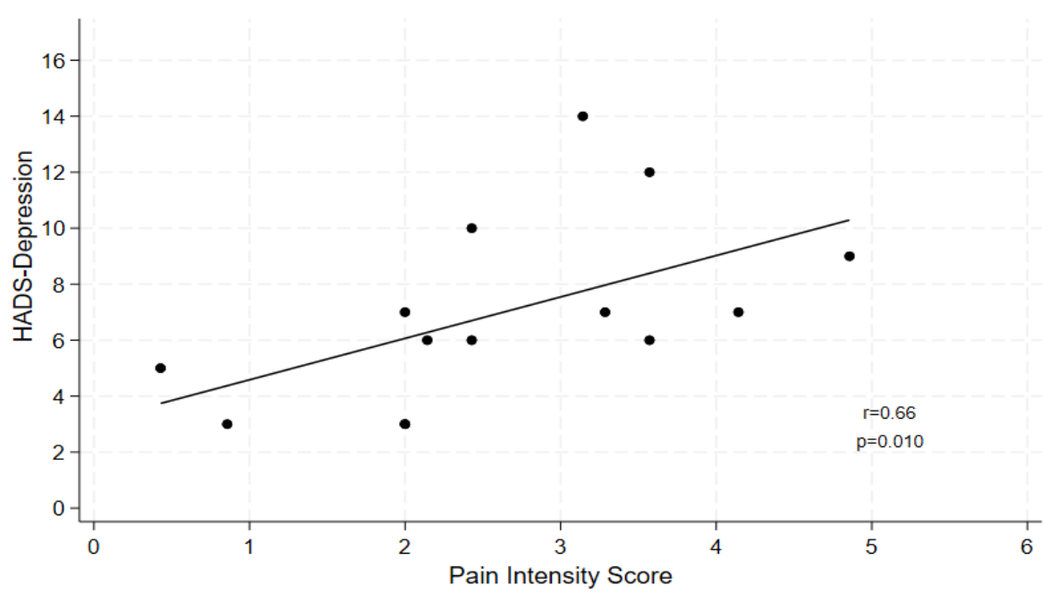


Fig.1- Relationship between pain intensity and depression

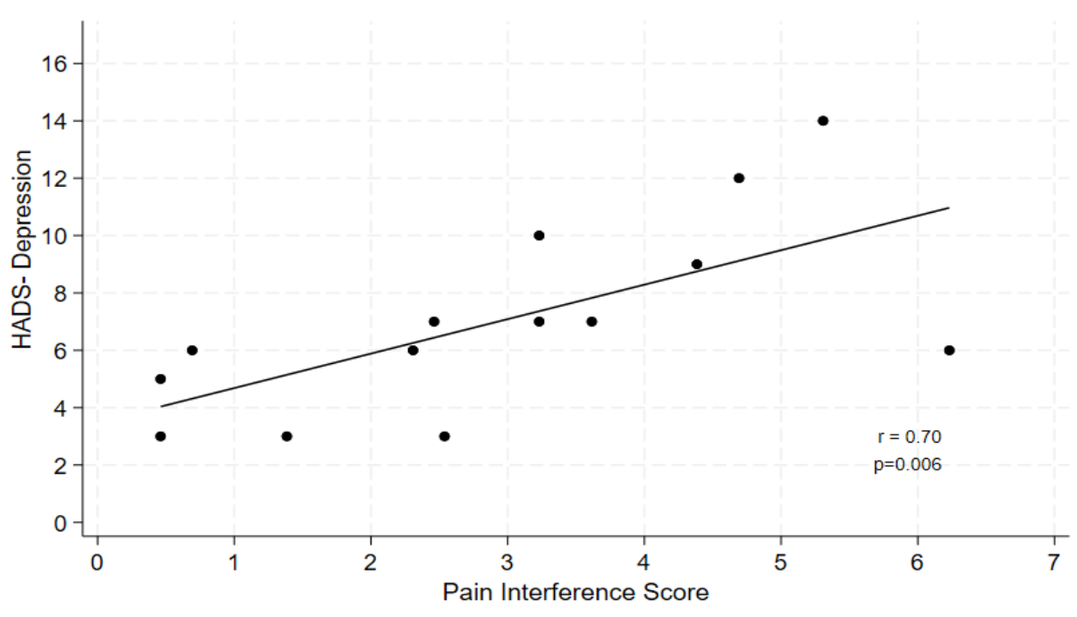


Fig.2- Relationship between pain interference and depression

CONCLUSION

In this group, most PD patients present moderate to severe pain intensity, and this was positively related to depression and disability. This suggests the importance of a multidisciplinary approach in the treatment of chronic pain, including not only pharmacological measures, but also psychological and rehabilitation interventions. Understanding this relationship can provide valuable information about the clinical management of these patients.

References:

1- Rana A.Q. et al. (2017) Disability from pain directly correlated with depression in Parkinson's disease. *Clin Neurol Neurosurg* 160, 1–4.

2- Negre-Pages L. et al. DoPaMiP Study Group (2008) Chronic pain in Parkinson's disease: The cross-sectional French DoPaMiP survey. *Mov Disord* 23, 1361–1369.

3- Curi R.G. (2014) Effects of deep brain stimulation on pain and nonmotor symptoms in Parkinson disease, *Neurology* 83:1403-1409.

Código.: 4DNC

BENEFITS OF ULTRASOUND-GUIDED RADIOFREQUENCY ABLATION TO TREAT MORTON'S NEUROMA

Emanuele Pires Canela dos Santos[1], Carla Cristina Barbosa Lopes[2], Diogo Barros Florenzano de Sousa[3], Isis Franco Martin[4]
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CASE PRESENTATION

A 48-year- old woman began to experience acute symptoms such as burning and shock-like pain between her third and fourth toes, in the intermetatarsal region, mainly in the morning, when getting up. As she works most of the time standing up, she had symptoms of burning feet and need to remove shoes to relieve compression. When using the visual analogue scale (VAS) -the pain score, was 8. After making the diagnosis of Morton's neuroma (MN), following the clinical criteria, probative test and magnetic resonance imaging, the patient opted for conservative treatment as changes in showear, using of nonsteroid anti-inflamatory drugs (NSAID's) and strengthening exercises in the gym. As the patient did not have favorable clinical responses, the ultrasound-guided radiofrequency (RF) was then perfomed, with an injection of 1ml of Glicose 5%, Triamcinolone 0,5 ml and 1 ml of Ropivacaine 0,75% .A 10mm sharp needle guided by ultrasound was used. It was Applied for 8 minutes at 50V. The VAS score was obtained pre (VAS=8) and postoperatively (VAS=0). No side effects or disabilities were seen in this case. Immediate and 12 months outcomes were excellent. The patient have been oligosymptomatic , with significant improvement in pain (VAS 0 to 4) . She presents some episodes of low intensity pain but remains asymptomatic on most days.

DISCUSSION

MN is a painful condition that affects the ball of the foot, most commonly between the third and fourth toes. This can cause symptoms like tingling, burning or numbness pain and with the urgent necessity to liberate the foot from shoe compression. Treatment can range from changing shoes habits, pharmacological therapy to surgical excision. Ultrasound-guided radiofrequency ablation (US-RFA) is a minimally invasive procedure associated with pain relief for MN. The procedure has just a few or no side effects or disability and has been a good option therapy for patients that have not received adequate relief from other treatments. Although US-RFA treatment has shown good effectiveness, most patients have a return of pain after a few months.

Figure 1



Figure 2

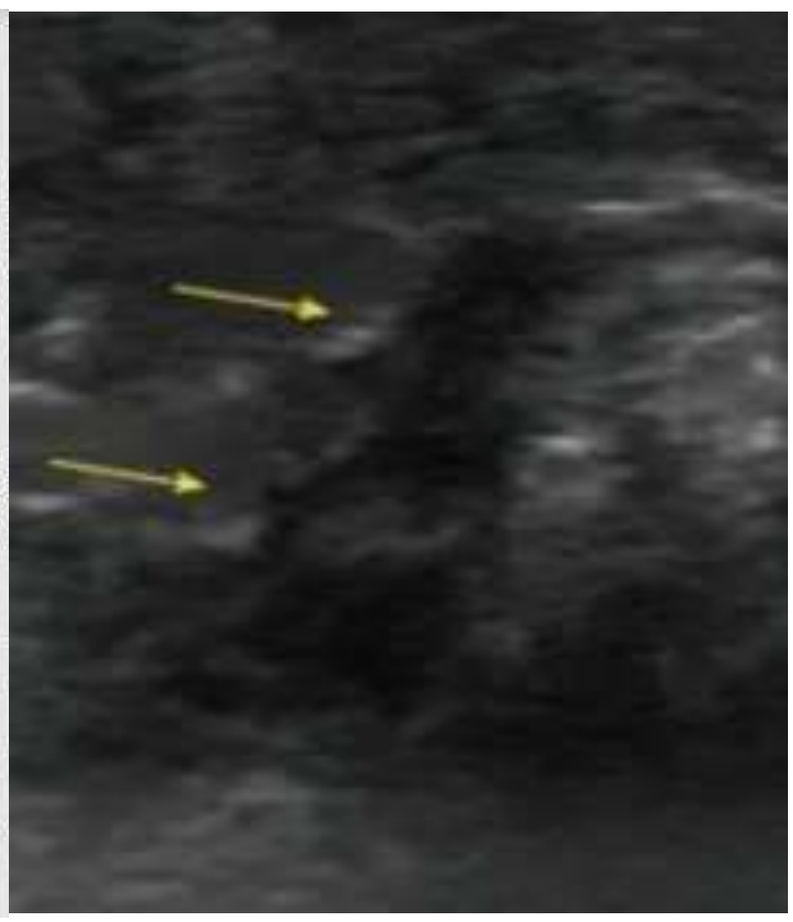


Figure 1- RM T1 showing the Morton's neuron between the 2°/3° and the 3° and 4° toes. Figure 2-US demonstrating a ovoid,well-defined,hypoechoic lesion in the intermetatarsal space

CONCLUSION

In this case report, we demonstrated a long-term relief (12 months) of MN pain after RFA treatment . Overall, the literature provided insufficient evidence to determine the optimal management of Morton's neuroma, we report a case of good evolution after US-RFA. New studies are needed for further prove how safe and effective the US-RFA is for treating MN and how long your benefit can last.

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Código.: 4DNF

REFRACTORY TRIGEMINAL NEURALGIA TREATMENTOUTCOMES FOLLOWING INVASIVES PROCEDURES

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CASE PRESENTATION

A 58-year-old female presenting trigeminal neuralgia (TN) was evaluated at the chronic pain outpatient clinic. Symptoms included intense electric shock-like pain in the right hemiface involving innervation of the maxillary and mandibular territory of the fifth cranial nerve. The patient had an average of more than 10 daily crises of lancinating pain. When using the visual analogue scale (VAS) has been classified as 10. First line pharmacological therapies were initiated but they were found to be ineffective. Botulinum toxin (TB) injections were then proposed, quarterly, but the treatment was again futile. As the painful symptoms persisted, US-guided peripheral trigeminal blockade was performed but no benefit has been seen. Percutaneous balloon compression of Gasserian ganglion for TN was done successfully and no improvement was reported. As the patient clinical status was not favorable to microvascular decompression of the fifth nerve , the sphenopalatine ganglion block (SGB) test was indicated with injection of 2 ml of Ropivacaine guided by fluoroscopy and the patient experienced a very good improvement and a VAS=1 immediately after procedure, has been reported. Considering the positive outcome of SGB test , the pulsed radiofrequency treatment of the ganglion sphenopalatinum (SPG) has been proposed as the final form of treatment.

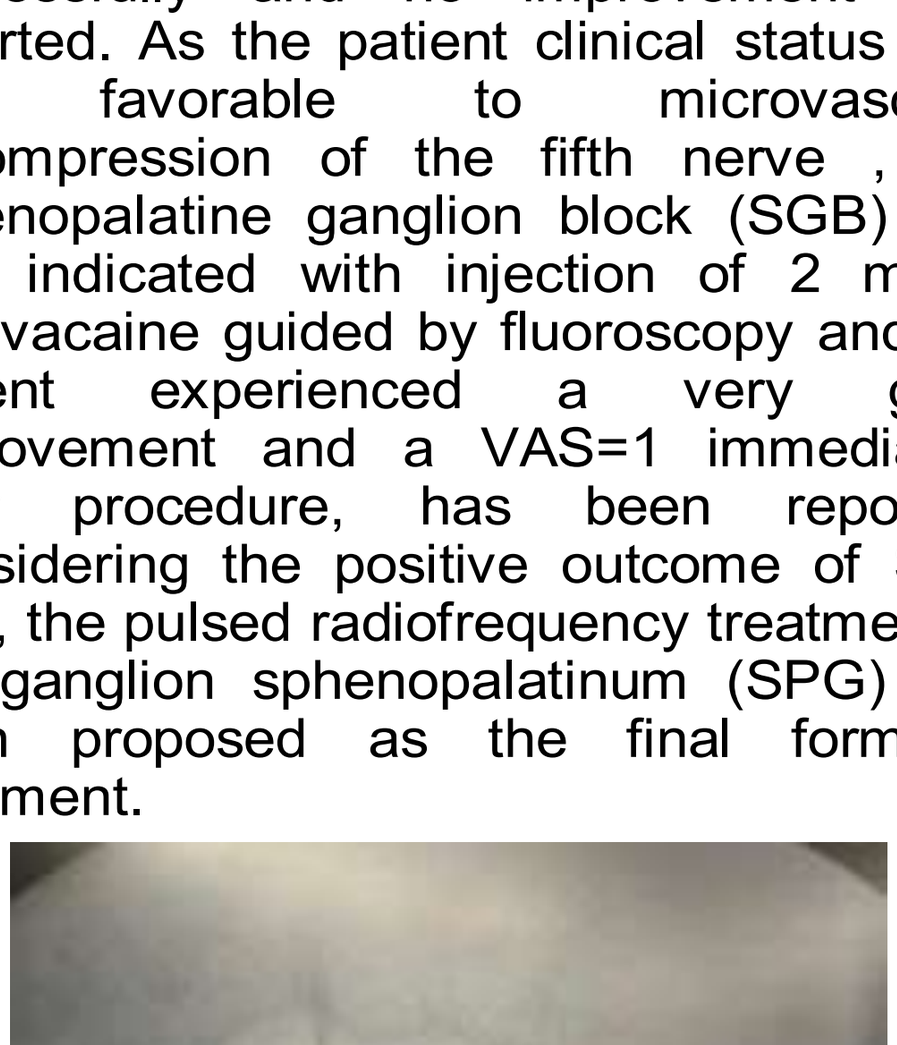


Figure 1 demonstrating the SPG



Figure 2 demonstrating a lateral view of the SPG

DISCUSSION

TN is a facial pain characterized by unilateral pain following the sensory distribution of the fifth cranial nerve, the trigeminal. The TN pain is characteristically severe, paroxysmal ,lancinating, with a sensation of electrical shocks, with pain attacks varying from 1 to 12 or more daily. The TN treatment can range from pharmacologic therapy to surgery. SPG has been a neural target for treatment of facial pain, TN and headache. This ganglion can be easily accessed and during the years your blockade has been effective in the short-term treatment of TN.SGB is a minimally well tolerated option for TN. The analgesia is effective but temporary (some few hours).

CONCLUSION

In this case-report the patient reported a facial pain improvement for some days before it returned. After SGB the patient improved pain as well as their quality of life. In this case report we could observe the effectiveness of the SGB ,especially in a patient with symptoms refractory to other procedures. More randomized controlled trials and case-reports like this are needed to confirm the safety and effectiveness of the SGB procedure in the TN treatment.

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Código.: 4DNG

Cortical Neurostimulator Implantation: A Promising Alternative in the Treatment of Atypical Facial Pain - Case Report

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CASE REPORT

The 64-year-old female patient has a history of previous surgical interventions for the treatment of cavernous angioma and cerebrospinal fluid fistula. She presented atypical facial pain as a sequel to cavernoma bleeding Figure 1; the clinical treatment with carbamazepine, pregabalin, duloxetine, and nortriptyline was unsuccessful. In 2021, a microvascular decompression of the trigeminal nerve was performed to treat typical and atypical facial pain, but it yielded no results. Upon referral to our service, she complained of stabbing pain, burning, and hypoesthesia in the left half of her body, with greater intensity on the left side of her face. The pain was continuous and disconnected to autonomic symptoms. The patient reported pain score of 10 on the Visual Analog Scale for Pain, with complete functional impairment. Clinical investigation confirmed the diagnosis of atypical facial pain according to the criteria of the International Classification of Headache Disorders (ICHD-3). A cortical neurostimulator implantation was conducted as the therapeutic measure. Patient showed improvement in her condition postoperatively. Leastly, the neurostimulator was adjusted in the office, with settings of 9.9 mA, pulse length of 210, and frequency of 60 MHz. Subsequently to the procedure, the patient experienced significant improvement in her life quality, satisfaction with the surgical outcome, and a pain score of 7 on the Visual Analog Scale for Pain

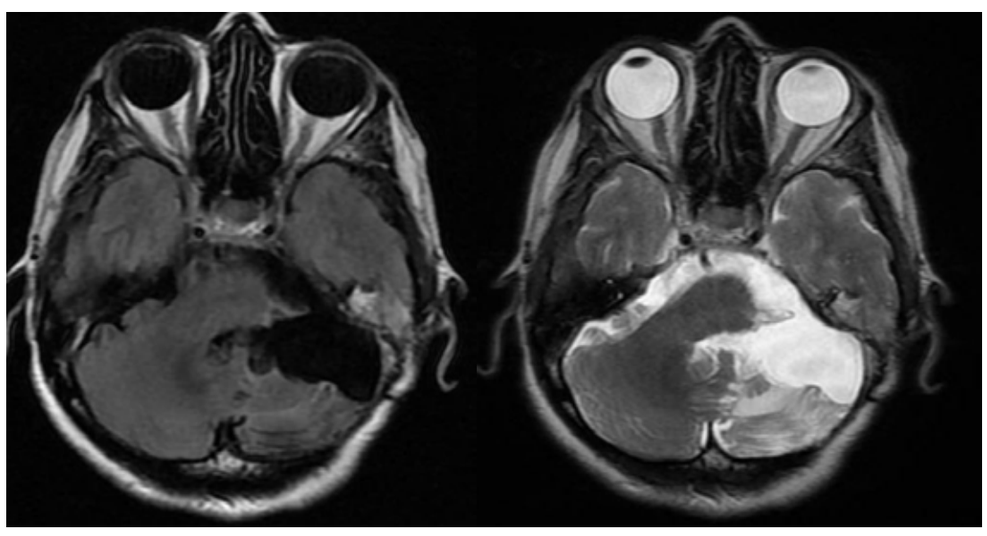


Figure 1: Pre operative MRI

DISCUSSION

The treatment of atypical facial pain is indeed challenging. The main treatment modalities currently used include nucleus caudalis dorsal root entry zone lesioning (NC DREZ lesioning), tractotomy, nucleotomy, and cortical neurostimulator implantation. Existing literature supports the effectiveness of motor cortex stimulation in managing patients with common treatment-refractory atypical facial pain.

In the case of a patient with central origin lesion in the brainstem the decision to opt for cortical stimulation implantation was based on the specific pathophysiology of the pain in this instance. Furthermore, literature suggests the superiority of this procedure in cases of central pain caused by brainstem lesions. Motor cortex stimulation-induced pain relief is thought to occur through the activation of descending pain control systems from the motor cortex to the thalamus and potentially to motor brainstem nuclei. Additionally, it may involve reducing affective responses to pain by activating the orbitofrontal-perigenual cingulate cortex.

CONSIDERATIONS

Cortical neurostimulation holds promise for central neuropathic pain treatment, benefiting patients and improving their life quality. It is increasingly valued for managing atypical facial pain, showing efficacy and enhancing well-being

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Código.: 4DNJ

REPORT OF MECHANICAL COMPLICATION OF INTRATHECAL DRUG INFUSION DEVICE - PATIENT MANIPULATION OF THE PUMP LEADING TO MULTIPLE TWISTS OF THE CATHETER

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CASE REPORT

We present a case of multiple twists of the catheter attached to the intrathecal drug infusion device around its own axis, due to manipulation of the pump by the patient, over the abdômen (Figure 1). An 83-year-old lady, suffering from chronic lumbosciatica associated with severe neurogenic claudication for over 10 years. Past history of knee arthroplasty with good response to the left, but no improvement to the right. She was under pain clinic follow-up and despite optimization of analgesia and nerve blocks, sustained pain relief was not achieved, resulting in continuous suffering. After showing good response for over 12 hours to the intrathecal morphine administration test, it was decided to implant an intrathecal drug infusion device for morphine administration. After 11 months of device use, malfunction of the system was identified. Surgical intervention was opted for system revision, and intraoperatively it was evident that the suture fixing the pump had ruptured and that the pump had been turned 180 degrees multiple times by the patient, leading to catheter twisting (Figure 2A; Figure 2B) and obstruction to drug passage. The distal part of the catheter was replaced with a new one after testing the patency of the proximal catheter with contrast and fluoroscopy. Additionally, 19.5mL of morphine was found inside the pump.

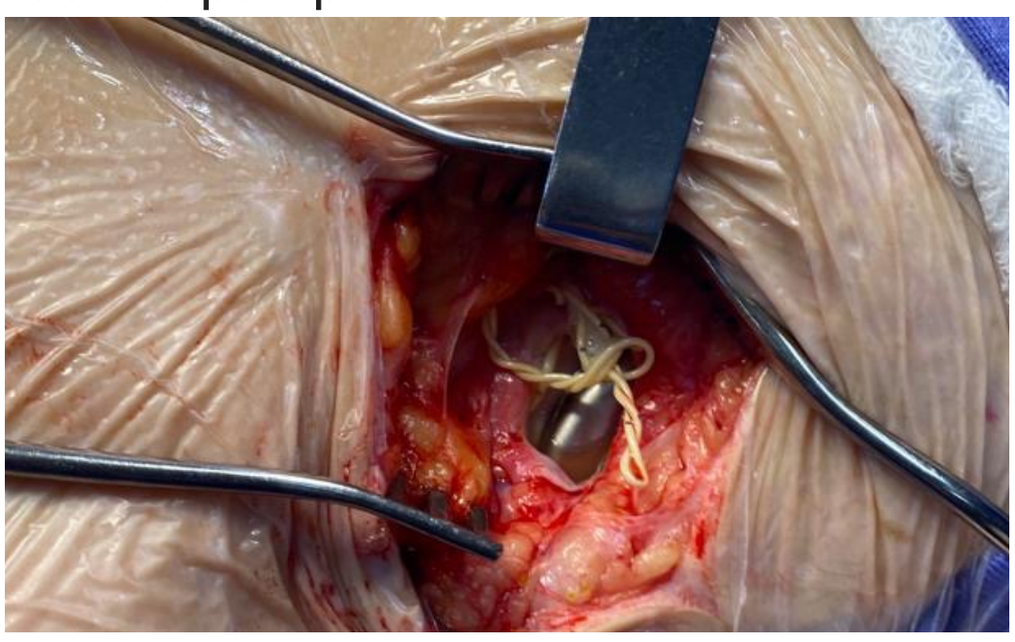


Figure 1 Intraoperative image of system revision of intrathecal drug infusion device, showing the drug reservoir and the twisted catheter.

DISCUSSION

Possible mechanical complications include loss of catheter pump propulsion (detected as abnormal drug delivery rate leading to overdose or underdose with acute withdrawal symptoms), pump mechanical problems, loss of administered agent, catheter displacement, and catheter twisting. Rarely, a pump may "flip" 180 degrees within the abdomen. The annual rate for mechanical complications requiring surgical intervention is reported to be 10.5%, with the majority being catheter-related (65%) versus pump-related (35%).

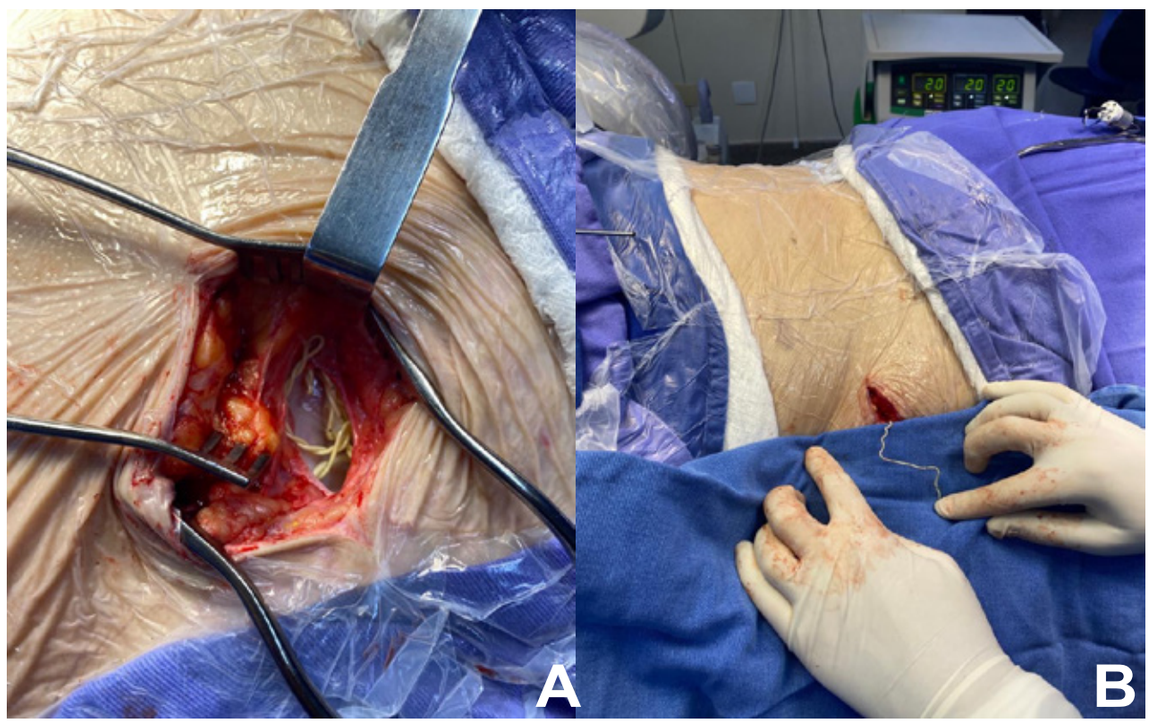


Figure 2A. Intraoperative image showing the twisted catheter inside the abdomen, after removal of the reservoir. **Figure 2B.** Image showing the moment of catheter removal, revealing its multiple twists.

CONSIDERATIONS

The reported case is a rare example of a complication related to the catheter, in which it twisted upon itself after the patient rotated the pump, palpating her abdomen at the site of the device. The literature reports instances of kinking, obstruction, and catheter twisting; however, there are no reports of multiple twists as described.The case presented is a rare example of a mechanical complication that can occur, in which the pump was turned multiple times by the patient herself.

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Código.: 4DNM

OCCIPITAL NEURALGIA AFTER VESTIBULAR SCHWANNOMA RESECTION: PERIPHERAL NERVE STIMULATION FOR PAIN CONTROL – A CASE REPORT

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INTRODUCTION: When performing vestibular schwannoma resections, also known as acoustic neuromas (AN), it is common to consider the preservation of hearing and facial nerve function. Postoperative tension-type headache and trigeminal neuralgia are complications already described in the medical literature.(1) Occipital neuralgia following AN resection is a rare complication and commonly refractory to conservative treatments, requiring surgical interventions for adequate pain control, with peripheral nerve stimulation being one of them.(2)

CASE PRESENTATION: A 36-year-old female patient, with no comorbidities but a history of previous right-sided AN surgery in 2013. After five years, she was admitted to our service due to tumor recurrence. Microsurgery with intraoperative physiological monitoring was performed, aiming to preserve facial nerve function. Postoperatively, the patient developed intense acute paroxysmal pain in the right occipital region, described as sudden, severe and stabbing recurrent episodes of facial and skull pain. Initially, anti-inflammatory drugs and analgesics were administered for pain control, followed by high doses of amitriptyline, duloxetine, and pregabalin with no results. Following pain resistance, minimally invasive and surgical interventions were opted for. Firstly, an occipital nerve block was performed, which provided partial short-term pain relief. Due to the still significant symptomatology, the patient underwent subcutaneous stimulation of the right occipital nerve, achieving significant remission of the pain syndrome.

DISCUSSION: Neuropathic pain in the head and neck regions has been challenging to treat. In recent years, peripheral nerve stimulation has been studied with emphasis on these topographies. There is more evidence supporting its use for pain control of complications such as chronic migraine and trigeminal neuralgia than for occipital neuralgia.(3,4) In general, surgical interventions for AN treatment have satisfactory results. However, the emergence of complications such as headache in this group of patients significantly reduces quality of life and is correlated with a higher risk of postoperative retirement.(5)

CONCLUSION: Although occipital neuralgia is a rare sequela in AN resection, this report underscores the importance of intraoperative care of the occipital nerve. Due to its significant impact on patients' lives, studies aiming at pain management are necessary, to which peripheral nerve stimulation appears promising.

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Código.: 4DNR

PREDICTION OF RESPONSE TO TRANSCRANIAL MAGNETIC STIMULATION IN THE MOTOR CORTEX IN PATIENTS WITH FIBROMYALGIA: PRELIMINARY STUDY

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INTRODUCTION

Reduced gray matter volumes in specific areas, such as the left medial prefrontal cortex and the right dorsal posterior cingulate cortex, are present in individuals with fibromyalgia(1). We hypothesized that values of these cortical areas may predict the response to the analgesic effect of M1-rTMS in people with fibromyalgia.

METHODS AND MATERIALS

62 participants with fibromyalgia from a multicenter, randomized, double-blind, placebo-controlled clinical trial "Transcranial magnetic stimulation of the precentral gyrus in the relief of FM pain: a controlled adaptive trial" were included in a secondary analysis, and the prediction of response to transcranial magnetic stimulation in the motor cortex was assessed, were evaluated during the baseline and at the 8th week. They received the intervention conventional rTMS (i.e., 10Hz TMS session) or sham rTMS (i.e., sham TMS), based on the randomization assignment. The following baseline and at the 8th week variables were assessed: Charlson Comorbidity index, Visual Analogue Scale, Brief Pain Inventory, Hospital Anxiety and Depression Scale, Fibromyalgia Impact Questionnaire. In addition to the data collected in the clinical trial, the collection of Conditioned Pain Modulation and Magnetic Resonance Imaging was performed in both the active group and the sham group of participants.

RESULTS

All participants were women, and the median VAS was 8 points. Baseline and Week 8 assessments for disease-related scales. 15 (N=32) participants in the intervention arm reached a ≥ 50% reduction in VAS, against 7 (N=30) in the sham arm (p = 0.053).
Although not statistically significant in this subsample, treatment effect was deemed present in the full trial sample. So far, we evaluated baseline scales that might predict the response to TMS: HADS; BPI; FIQ; TAS and CPM, as well as their subscales, when appliable. None had a statistically significant association with the primary endpoint either in the full sample or in the TMS group. None of the MRI imaging volumes assessed was significantly associated with the primary outcome (Table 1).

Table 1. Comparison of MRI volume assessments according to VAS improvement ≥50% (TMS Only)

Characteristic	Responder, N = 12[1]	Non responder, N = 11[1]	p-value[2]	Responder, N = 12[1]	Non responder, N = 11[1]	p-value[2]
Insula	5916 (5630 – 6084)	6071 (5487 – 6604)	0.449	5843 (5529 – 5974)	5885 (5429 – 6309)	0.413
Precentral gyrus	10714 (9983 – 11848)	11016 (10419 – 11322)	0.976	10388 (10087 – 11077)	10156 (9728 – 11650)	>0.999
Postcentral gyrus	7853 (7590 – 8410)	8108 (6905 – 8586)	0.880	7724 (6821 – 7943)	7710 (6922 – 8751)	0.651
Paracentral gyrus	2889 (2551 – 3135)	2658 (2373 – 2811)	0.230	2839 (2727 – 3531)	3161 (2691 – 3613)	0.525
Rostral anterior cingulate gyrus	1998 (1819 – 2241)	2075 (1870 – 2290)	0.880	1486 (1294 – 1561)	1499 (1226 – 1645)	0.976
Caudal anterior cingulate gyrus	1361 (1216 – 1494)	1460 (1262 – 1611)	0.608	1649 (1442 – 1752)	1549 (1319 – 1947)	0.608
Cingular isthmus	2092 (1955 – 2242)	2234 (1951 – 2411)	0.525	2046 (1799 – 2192)	2006 (1877 – 2092)	0.902

[1]Median (IQR); [2]Wilcoxon rank sum test

DISCUSSION

Thirteen studies investigating fMRI associated with pain thresholds found that individuals with FM exhibited increased cortical blood flow to brain regions involved in pain processing, even with lower levels of stimulation. Additionally, there was evidence of reduced connectivity within the descending pain-modulation system in FM patients, particularly between the ACC and the amygdala, hippocampus, and brainstem(3). The ACC, periaqueductal gray, and rostral ventromedial medulla are key components of the descending pain processing pathway(4).

CONCLUSION

These are preliminary data from our study. So far, this has been the first study to evaluate response prediction to Transcranial Magnetic Stimulation.

Código.: 4DNS

FAST-ACTING SUB-PERCEPTION THERAPY FOR THE TREATMENT OF CHRONIC PAIN: PRELIMINARY STUDY

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INTRODUCTION

FAST is a new sub-perception-based SCS method developed that exploits the feeling of paresthesia as a marker for precise targeting of sub-perception stimulation with surround inhibition(2). This study aims to evaluate pain relief and quality of life among subjects with chronic pain symptoms who were implanted a SCS with the FAST-SCS approach.

METHODS AND MATERIALS

Patients included in this prospective analysis were programmed using 90 Hz and 210 ± 50 μs. Two leads were placed in T8-T10 parallel. All patients used their external controller to adjust intensity values within a range 0% of their perception threshold. The BPI, VAS and SF 12 scales were used.of 30–7.

RESULTS

The average age of those assessed in this study was 48 years and 65% (13/20) were female, and 75%of patients were classified with Failed Back Surgery Syndrome.

Table 1. VAS according to time	
Characteristic	**N = 20**
VAS on baseline	
Median [IQR]	10 [9 - 10]
Range	8 - 10
VAS 10 minutes after stimulation	
Median [IQR]	4 [3 - 4]
Range	2 - 5
VAS 3 months after implantation	
Median [IQR]	2 [1 - 3]
Range	0 - 3
VAS 6 months after implantation	
Median [IQR]	2 [0 - 2]
Range	0 - 3
Decrease in VAS (10 min)	
Median [IQR]	6 [5 - 6]
Range	5 - 8
Decrease in VAS (3m)	
Median [IQR]	7 [7 - 8]
Range	6 - 10
Decrease in VAS (6m)	
Median [IQR]	8 [7 - 8]
Range	6 - 10

Table 2. BPI Decrease		
Variable	Decrease (95% CI)	P Value
BPI Severity	7.01 (6.36 - 7.67)	<0.001
BPI Interference	7.36 (6.67 - 8.05)	<0.001

Table 3. SF-12 Improvement		
Variable	Improvement (95% CI)	P Value
SF12 - PCS	19.47 (16.55 - 22.38)	<0.001
SF12 - MCS	29.49 (25.06 - 33.91)	<0.001

DISCUSSION

The selectively stimulation of dorsal columns from the surround may overcome the excitatory effects of activating dorsal columns originating from the center-inhibition that would not be possible by stimulation of the center alone(6). A study in Germany showed an average pain score reduction of 6.9 points, and notable improvements in ODI and EQ-5D-5L were also observed at the 6-month follow-up(4). In our case series, after 3 months with FAST stimulation, there was an approximately 80% reduction in the VAS. We observed that our patients also showed a decrease in the values referred to in BPI scale after 6 months of stimulation. The SF12 scale showed a significant improvement in the quality of life of all patients.

CONCLUSION

The FAST therapy is a treatment that has proven to be effective in reducing pain, and it has shown promise in improving quality of life and reducing disability.

Código.: 4DNV

JOINT APPROACH USING PERCUTANEOUS TECHNIQUE FOR CERVICAL AND LUMBAR SPINAL CORD STIMULATION

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INTRODUCTION

Percutaneous leads are less invasive and performed in the outpatient setting, reducing the risks of exposure to various types of anesthesia or surgical intervention (1,2). Additionally, these leads have been shown to be less likely to break compared with paddle leads (3,4).

METHODS AND MATERIALS

We discuss the details of the combined percutaneous lead placement technique in the cervical and thoracic spine performed in a single surgical session, using a Case Report as an example.

RESULTS

A 43-year-old woman presented with a four-year history of intractable neuropathic pain in the left upper extremity and right lower extremity secondary to fusion surgeries in the cervical and lumbar spine. A spinal cord electrode implantation surgery was performed in the cervical spine at the C3-C6 level and in the thoracic spine at the T8-T10 level using the percutaneous lead placement technique.

DISCUSSION

Initially, a puncture was made at T12 for the electrodes implanted in the cervical spine and at L1 for the electrodes implanted in the thoracic spine (Figure 1). A notable detail of the technique we use is that the initial electrodes traveled laterally to the spinal canal, and only at the higher thoracic levels did they assume a centralized position. This allowed the thoracic electrodes to be implanted without interference from the cervical electrodes (Figure 2). Both sets of electrodes were implanted from the thoraco-lumbar region, allowing a single 32-contact generator to serve both implants, making the technique minimally invasive (Figure 3).

Figure 1

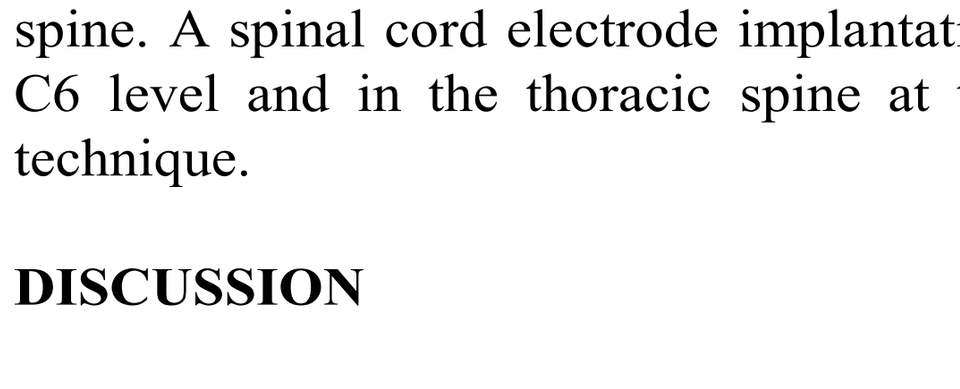


Figure 2

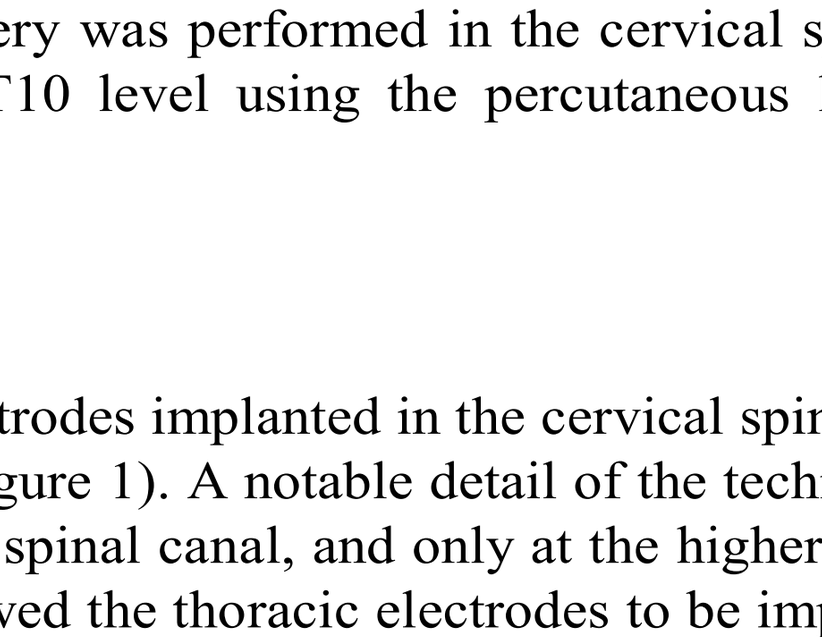
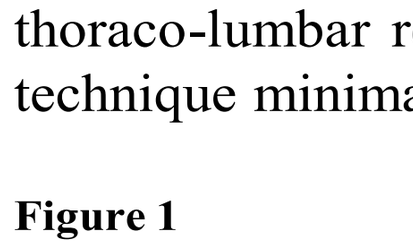


Figure 3



CONCLUSION

Technical details must be taken into account to ensure good results.

Código.: 4DNW

NEW TECHNIQUE FOR ANCHORING IN OPEN PLACEMENT OF PADDLE-TYPE SPINAL CORD STIMULATOR ELECTRODE AND CASE REPORT

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INTRODUCTION

Although not very common, the migration of the plate electrode is a serious complication of spinal cord stimulation (1). It is anticipated in cervical implants where the generator is placed in the lumbar region, leaving the electrode wire under significant tension and at risk of electrode displacement.

METHODS AND MATERIALS

We performed a new technique of "Anchoring with skull closure plate" for the open paddle-type surgery and describe case report

RESULTS

A 32-year-old woman presented with a four-year history of intractable pain in the left upper extremity and thoracic region, previously controlled by SCS. Imaging revealed plate displacement of the cervical electrode (Figure 1). The generator, previously implanted in the lumbar region, was retained during the reapproach at the patient's request to avoid additional scarring in other areas (Figure 2). The electrode revision was performed using the skull closure plate anchoring technique (Figure 3).

Figure 1

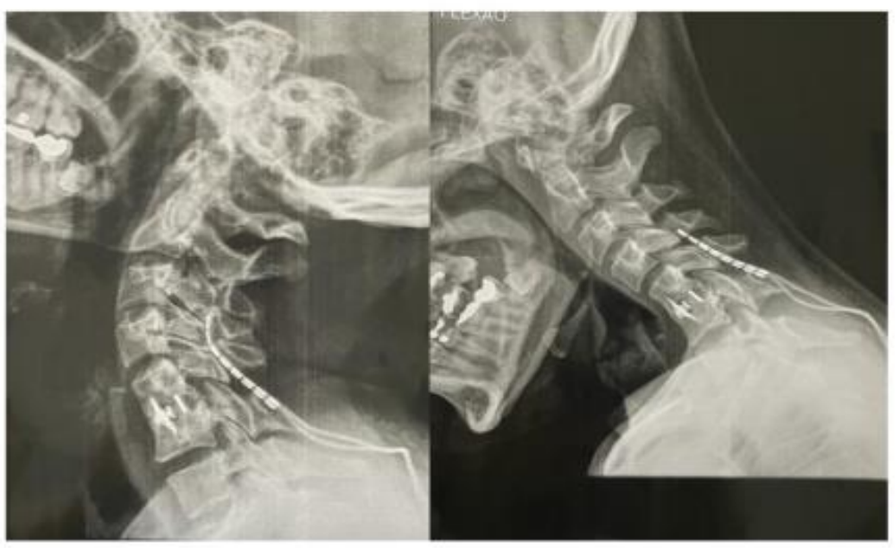


Figure 2



Figure 3



DISCUSSION

The literature reports a range of migration rates, spanning from 13% up to 69% (2). In an analysis conducted by Turner and colleagues, they determined the typical migration rate to be close to 24% (3). The expense of altering or substituting the lead falls between $2700 and $5450 (4), resulting in an escalation in the procedure's overall cost by an estimated 15-20%.

CONCLUSION

The "Anchoring with skull closure plate" technique produces electrode stability, reducing the incidence of its migration.

TRABALHOS APROVADOS

Sub-eixo temático:

Distúrbio Movimento



16º CBENF
Congresso Brasileiro de Estereotaxia e Neurocirurgia Funcional
1º a 4 de maio de 2024 Florianópolis-SC

EXAGGERATED ALPHA RHYTHM FROM SUBTHALAMIC NUCLEUS DISCRIMINATES FREEZERS FROM NON-FREEZERS PARKINSON'S DISEASE PATIENTS: A POSSIBLE FEATURE FOR CLOSED-LOOP DEEP BRAIN STIMULATION

[1,2]J.P.A.Rodrigues , [1]P.R.T.Filho, [2]C.Carlotti, [4]D.C.Soriano, [3]M.S.G.Rocha [1,2]F.Godinho
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16º CBENF Congresso Brasileiro de Estereotaxia e Neurocirurgia Funcional
1º a 4 de maio de 2024 Florianópolis-SC

Selected as the best abstract of CBENF Floripa 2024

Introduction

Freezing of gait (FOG) is a disabling symptom affecting more than half of Parkinson's disease (PD) patients. Strategies to treat FOG are often ineffective. This underscores the need for potentially effective electrophysiological biomarkers to guide therapy

Methods

We recorded local field potentials (LFPs) from the subthalamic nucleus (STN) in 23 patients with Parkinson's disease during Deep Brain Stimulation (DBS) surgeries. These patients were classified based on the presence of Freezing of Gait (FOG): 14 with FOG and 9 without FOG (n-FOG). Power bands and dynamics of STN LFP rhythms were characterized at rest

Results

Patients with FOG showed higher power in the alpha band (9-14 Hz - FOG vs. n-FOG: 0.331 ± 0.087 vs. 0.248 ± 0.089; p = 0.011), as well as intermittent alpha burst amplitude (FOG vs. n-FOG: 0.610 ± 0.068 vs. 0.524 ± 0.086; p = 0.005). Both intermittent alpha burst amplitude (r = 0.330, p = 0.046) and elevated intermittent beta amplitude (22-35 Hz - r = 0.415, p = 0.011) were positively correlated with the FOG score. Conversely, only alpha burst amplitude was correlated with FOG severity (r = 0.479, p = 0.003), and only elevated beta burst amplitude was negatively correlated (r = -0.411, p = 0.014) with performance-oriented mobility assessment

Figure 1 depicts the method: LFP acquisition, CWT coefficient estimation

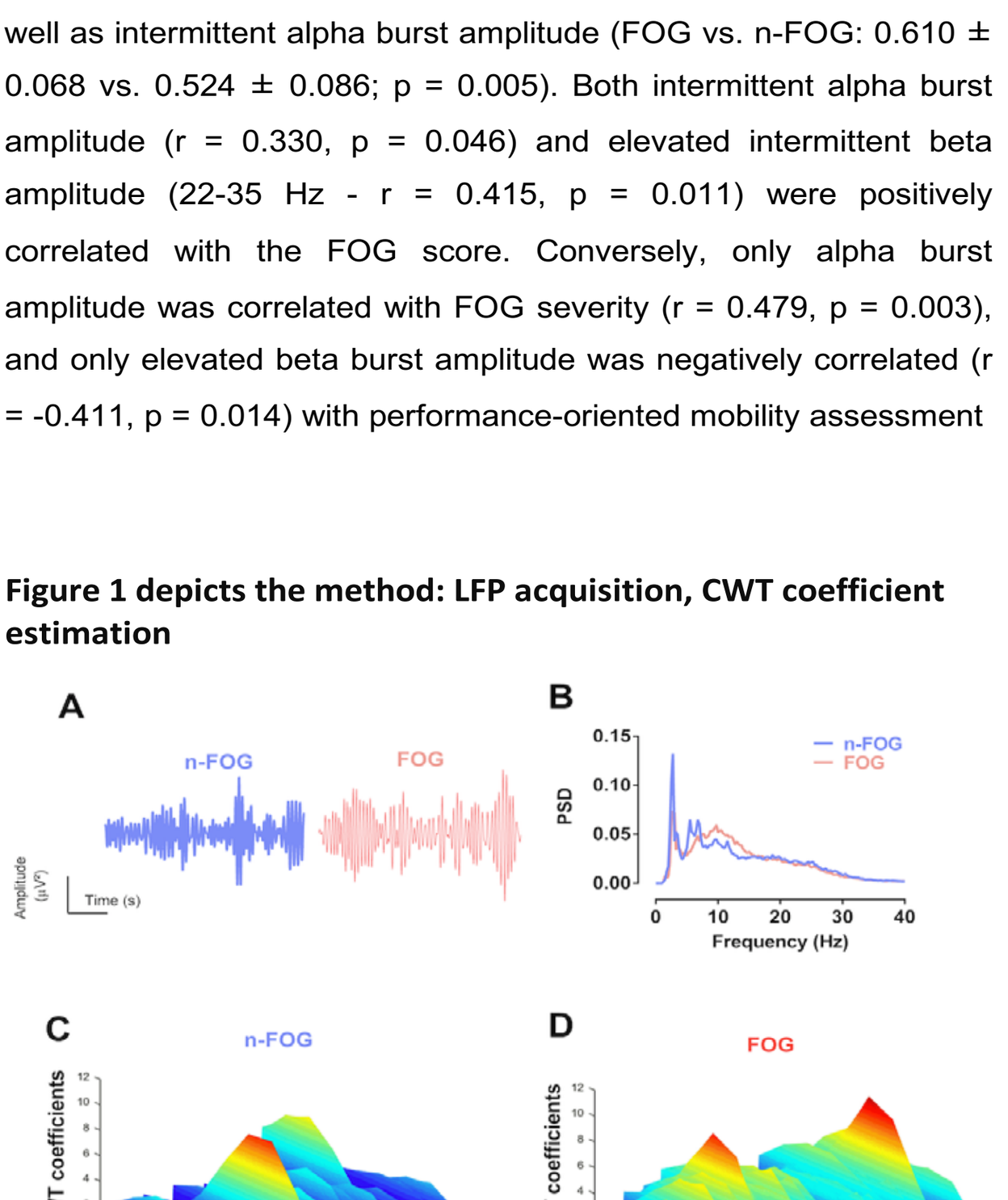


Figure 2: Higher alpha power in the FOG group. Positive correlation between beta power and rigidity

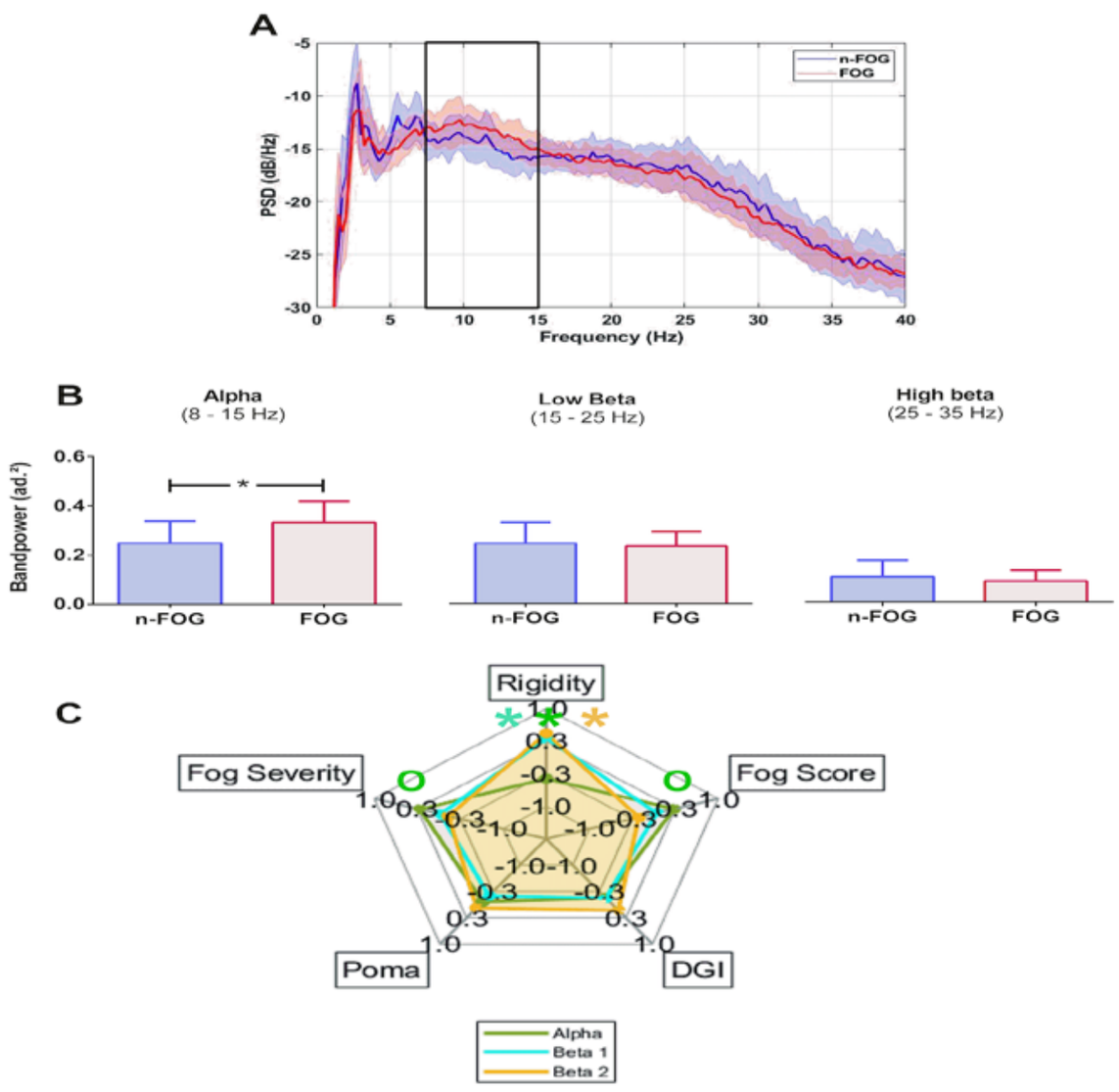
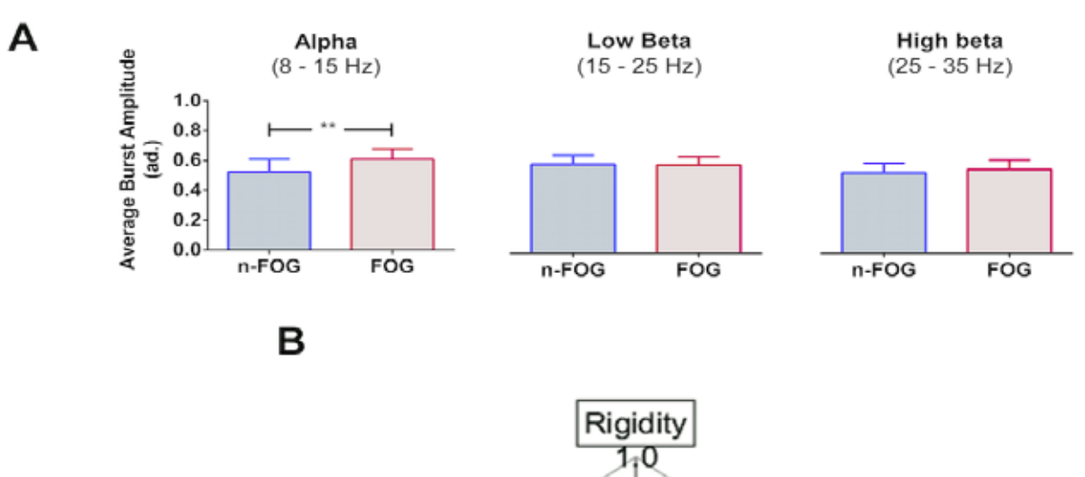


Figure 3: Alpha burst amplitude is higher in the FOG group; positive correlation between alpha burst amplitude and FOG score as well as FOG severity; positive correlation of beta2 burst with FOG severity; negative correlation of beta burst amplitude with POMA



Conclusion

Our data suggest a correlation between elevated subthalamic alpha and beta oscillations and FOG symptoms. This may contribute to the search for a potential and useful biomarker in future closed-loop brain stimulation algorithms

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Electrical stimulation of the subthalamic Nucleus versus forel's field in patients with Parkinson's disease. effects on motor symptoms and quality of life

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16º CBENF Congresso Brasileiro de Estereotaxia e Neurocirurgia Funcional
1º a 4 de maio de 2024 Florianópolis-SC

Introduction

Electrical stimulation of the STN: reduction of motor symptoms and improvement in quality of life. What are the effects on gait disorders (FOG)? . Stimulation focused on the fields of Forel (H1-FF): reduction of motor symptoms, including FOG. No long-term follow-up study has compared the effects of stimulation between STN and FF

Objective

Long-term (5-year) comparison of bilateral STN and H1-FF stimulation: motor functions, neuropsychological aspects, and quality of life in Parkinson's disease

Methods

22 patients (10 H1-FF/12 NST). Motor symptoms, cognition, quality of life, and gait disturbances: Part III MDS-UPDRS; Mattis Dementia Rating Scale (MDRS); PDQ-39; Freezing of Gait Questionnaire (FOG score); Daily Equivalent Dose of Levodopa (LED); Anatomical position of stimulation leads - LeadDBS

ong-term (5-year) comparison of bilateral STN and H1-FF stimulation: motor functions, neuropsychological aspects, and quality of life in Parkinson's disease

Results

Table 1. Demographic, Motor, Cognitive, and Quality of Life Data

	All participants	STN	H1-FF	p-value
Number of participants	22	12	10	
Gender – Male (%)	54.5	58.3	50	0.69
Age (yr)	55.73 (2.09)	51.2 (3.15)	61.2 (1.32)	0.01
PD duration (yr)	9.1 (0.84)	7.2 (0.63)	11.5 (1.37)	0.01
Follow-up duration (yr)	6.18 (0.29)	6.5 (0.48)	5.8 (0.25)	0.24
H&Y stage – median (range)	3.18(2 – 4)	3 (3 – 3)	3.4 (3 – 4)	0.01
MDS-UPDRS III - Motor	49.95 (2.03)	50.08 - 3.41	49.8 (1.99)	0.94
Tremor score	7.8 (1.4)	8.83 (2.0)	6.5 (1.9)	0.96
Bradykinesia score	22.4 (1.8)	21.9 (2.6)	23.0 (2.4)	0.66
Rigidity score	9.8 (0.9)	10.6 (1.5)	8.9 (1.2)	0.32
Axial score	8.95(3,9)	6,58 (3.4)	11.80(2,2)	0.01
FOG questionnaire	12.22 (1.01)	10.25 (1.15)	14.6 (1.44)	0.02
MDRS	134.5 (1.31)	137.92 (1.21)	130.6 (1.83)	0.01
PDQ-39	49.5 (3.95_	43.1 (4.75)	57.2 (5.93)	0.07
LED (mg/day)	1292.6 (110.2)	1059.5 (118.3)	1572.4 (160.9)	0.01

Table 2. ANOVA: Motor Data, LED, and Quality of Life

	STN			H1-FF			Two-way ANOVA	
	Baseline	Follow-up	P-value/d	Baseline	Follow-up	P-value/d	Follow-up	Target interaction
MDS-UPDRS III - Motor	50.1 (3.4)	27.9 (3.2)	0.0002 2.24	49.8 (1.9)	33.7 (2.5)	0.0002 2.27	F (1, 41) = 54.8 < 0.0001	F (1, 41) = 0.63 0.4321
Tremor subscore	8.83 (2.0)	2.3 (1.1_	0.0020 1.2	6.5 (1.9)	3.7 (1.2)	0.0074 0.54	F (1, 41) = 5.5 0.0245	F (1, 41) = 0.04 0.8343
Bradykinesia subscore	21.9 (2.6)	9.7 (1.8)	0.0002 1.58	23.0 (2.4)	13.5 (1.9)	< 0.0001 1.35	F (1, 41) = 24.5 < 0.0001	F (1, 40) = 1.2 0.2771
Rigidity subscore	10.6 (1.5)	4.2 (1.2)	0.0010 1.36	8.9 (1.2)	4.7 (0.9)	0.0003 1.26	F (1, 41) = 18.7 0.0001	F (1, 41) = 0.25 0.6240
FOG score	10.3 (1.2)	7.5 (0.9)	0,0007 0,76	14.6 (1.4)	9.5 (1.8)	0.0083 0.97	F (1, 41) = 8.23 0.0065	F (1, 41) = 5.6 0.0222
Axial subscore	6.58 (3.4)	4.5 (2.6)	0.0002 0.95	11.80(2.2)	6.6 (1.6)	0.0001 3.00	F (1,41) = 18.06 P=0.0001	F (1,41)= 19.57 0.0001
MDRS	137.9 (1.2)	135.5 (1.7)	0.0032 0.46	130.6 (1.8)	120.9 (3.7)	0.0069 1.05	F (1, 41) = 6.5 0.0143	F (1, 41) = 23.8 < 0.0001
PDQ-39	43.1 (4.8)	27.9 (3.2)	0.0001 1.08	57.2 (5.9)	43.2 (6.4)	0.0021 0.71	F (1, 41) = 8.6 0.85	F (1, 41) = 8.6 0.0056
LED (mg/day)	1059.5 (118.3)	840.2 (52.5)	0.0223 0.69	1572.4 (160.9)	1120.4 (119.8)	0.0001 1.01	F (1, 41) = 7.9 0.0073	F (1, 41) = 11.8 0.0014

Figure 1: Gray electrodes in the Forel's field

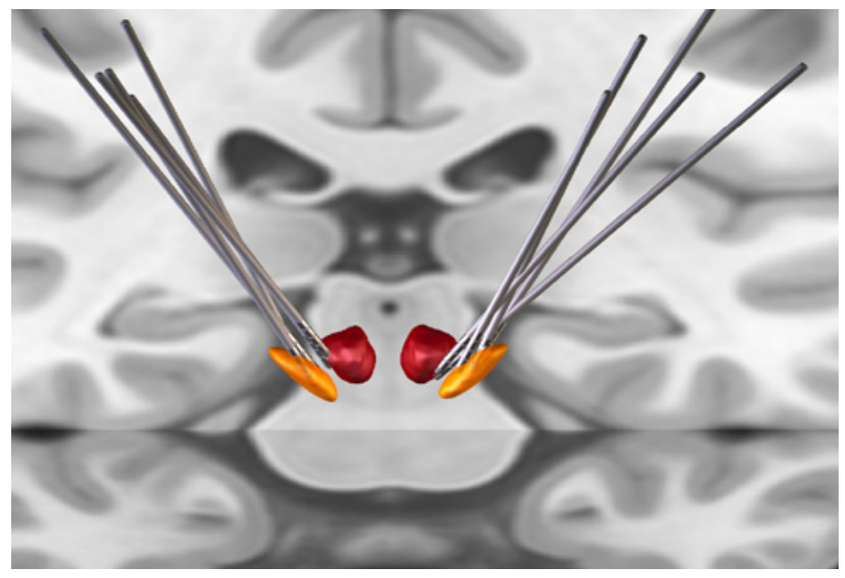


Figure 2: Blue electrodes in the STN

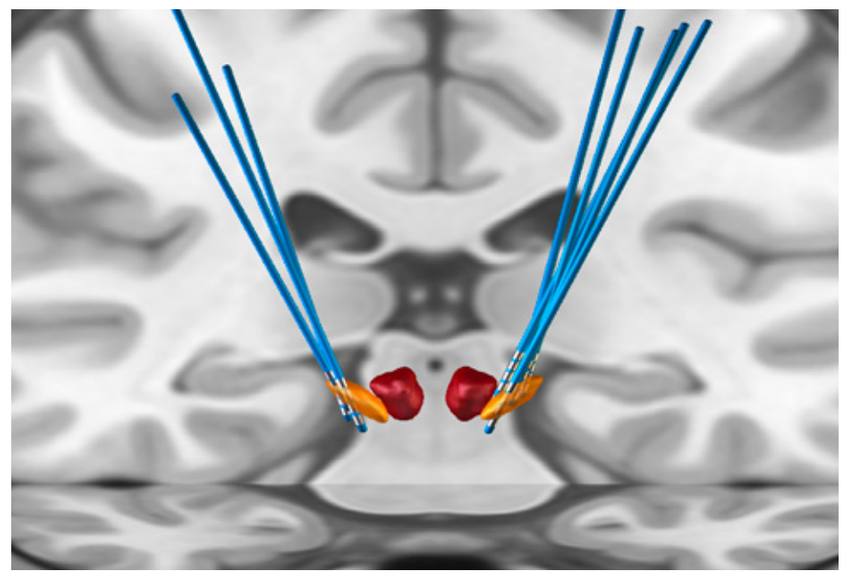


Table 3. Post-hoc: axial scores, FOG, cognition, and LED

Variable	Mean difference between scores (%)			Post-hoc
	All patients	STN	H1-FF	p-value
Axial Score	-39.0	-31.6	-43,5	0.01
FOG Score	-30.6	-26.1	-35.5	0.04
MDRS	-4,2	-1,7	-7.4	0.02
LED mg/d	-22	-20.7	-27.8	0.04

Conclusion

symptoms and quality of life after 5 years. Stimulation of H1-FF led to greater reduction in FOG and LED compared to STN stimulation. Thus, H1-FF stimulation is a feasible option for treating motor symptoms, including gait disturbances, in advanced PD. Age-related questions, PD stage, and modulation of cognitive circuits may explain the greater reduction in cognition in the H1-FF group.

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Código.: 4DMK

TRANSCRANIAL MAGNETIC STIMULATION FOR ESSENTIAL TREMOR TREATMENT: A CASE SERIES

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INTRODUCTION:

Transcranial Magnetic Stimulation (TMS) is a potential treatment for tremors due to its ability to modulate underlying pathological circuits and brain functions through the production of a magnetic field that induces a transient focal electrical field in the target brain region.

CASE DESCRIPTION:

M.A.R., 66y.o., had the onset of symptoms in childhood and presented vocal, head and bilateral tremors in the limbs with worsening on the right, having difficulty writing, eating, drinking coffee and performing manicures, leading to social embarrassment. She underwent therapeutic treatment with propranolol and 10 TMS sessions in 2022 in right dorsolateral prefrontal cortex (F4) using 10Hz, 1800 pulses, three centimeters anterior to left M1 using 1Hz and 400 pulses; and right cerebelar (IZ) using 1Hz 400 pulses. After TMS, she showed improvement in personal care, writing, speaking, reduced tremors by 20% and has greater confidence and coherence in reasoning. Long-term follow up three months after TMS showed maintenance of benefits.

G. P. M, 18y.o., presented with the onset of symptoms at the age of 8, with worsening since 2021, with tremor in the left upper limb and social embarrassment. He underwent therapeutic treatment with propranolol and then with 10 TMS sessions in 2023 in right dorsolateral prefrontal cortex (F4) using 10Hz, 1800 pulses, three centimeters anterior to right M1 using 1Hz and 400 pulses; and left cerebelar (IZ) using 1Hz 400 pulses. After a few months of TMS, his tremor of the left right upper limb improved from grade 2 to grade 1 and also his sleep improved. Long-term follow up three months after TMS showed maintenance of benefits.

DISCUTION:

Transcranial Magnetic Stimulation (TMS) is a potential treatment for tremors due to its ability to modulate underlying pathological circuits and brain functions through the production of a magnetic field that induces a transient focal electrical field in the target brain region. In this study, two cases of patients diagnosed for propranolol monotherapy are presented, given that pharmacological treatment is deficient and often unsatisfactory, failing to adequately control tremor. TMS treatment was performed.

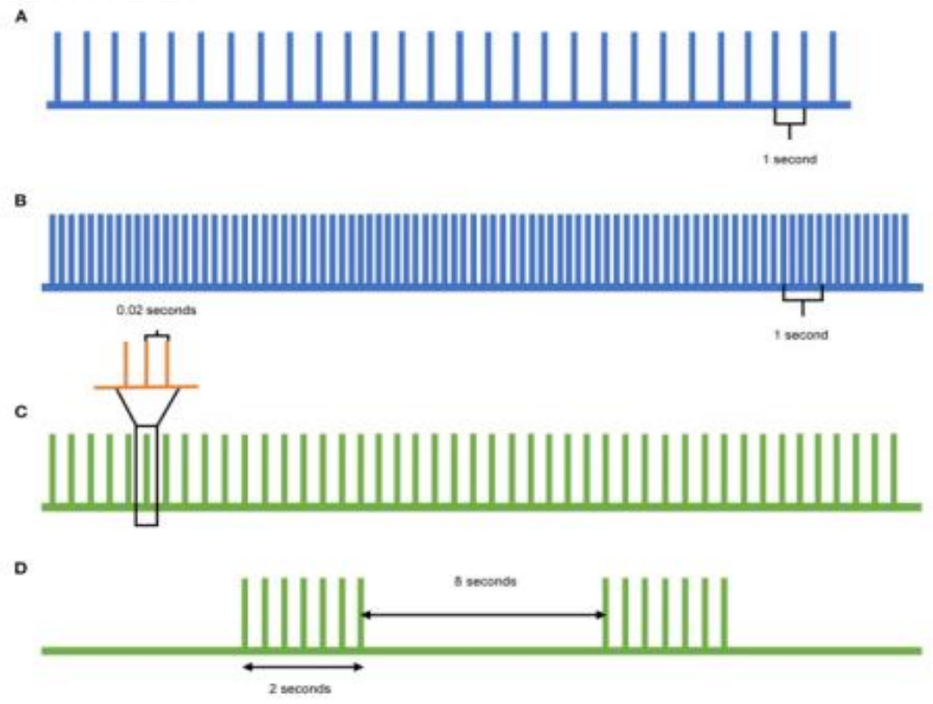


Figure 1: Pulse patterns of different rTMS protocols. (A) Low-frequency TMS is delivered at a rate of 1Hz or lower and acts as inhibitory stimulation. (B) High-frequency TMS is delivered at a rate of 5Hz or higher and acts as excitatory stimulation. (C) Continuous theta-burst stimulation (cTBS) delivers a triplet burst of pulses continuously, and acts as inhibitory stimulation. Each green pulse represents three pulses given at 50Hz (orange), whereas each green pulse is delivered at 5Hz. (D) Intermittent theta-burst stimulation (iTBS) delivers a triplet burst of pulses intermittently, acting as excitatory stimulation. Each triplet burst (green) is delivered at 5Hz over 2s with an 8s pause between. From Frey, Jessica et al. "Transcranial Magnetic Stimulation in Tremor Syndromes: Pathophysiologic Insights and Therapeutic Role." Frontiers in neurology vol. 12 700026. 26 Aug. 2021.

FINAL COMMENTS:

Transcranial Magnetic Stimulation in ipsilateral cerebellar region and contralateral M1 considering the worse tremor side is a promising therapeutic possibility for essential tremor patients. Possibly, the crossing dentatorubrothalamic tracts are involved in the improvement presented by these patients.

Código.: 4DMR

ASSESSMENT OF FGATIR EFFICACY IN 1.5 TESLA MRI IMAGING FOR PARKINSON'S DISEASE SURGICAL STRATEGY

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16th CBENF Brazilian Congress of Stereotaxic and Functional Neurosurgery
May 1st to 4th, 2024 Florianópolis-SC

Introduction: Published consensuses have confirmed that the success of treatment with radiofrequency or electrode implant for deep brain stimulation (DBS) in the Internal Globus Pallidus (GPi) can vary significantly depending on the trajectory and correct targeting location. Imaging-based planning for the internal globus pallidus (GPi) has been currently limited by the relatively poor contrast of its boundaries with neighboring anatomical structures. The Fast Grey Matter Inversion Recovery (FGATIR) technique facilitates the definition of the anatomical boundaries of the GPi, originally described using magnetic resonance imaging (MRI) with a 3 Tesla field (FIG.1). ***Objective***: To describe the utility of the FGATIR sequence obtained in 1.5 Tesla MRI equipment added to the routine protocol for stereotactic surgery planning. ***Method***: Stereotactic surgery was performed on 27 patients diagnosed with Parkinson's disease, Hoehn and Yahr stage 2.5, with motor fluctuations and dyskinesias. The average age was 62.1 years, and the average disease duration was 8.8 years. The surgery was unilateral, performed contralateral to the more severe parkinsonian side in 16 patients, and bilateral in 11 patients, totaling 38 plans. The target and trajectory were initially marked on previous MRI, using T2 and T1 contrast sequences. The FGATIR sequence acquired on the Philips 1.5T was added to define the target and suggested an average difference of 2.8mm in 13 plans, mainly on the x-axis. In 25 plans where the difference was less than 1mm, it was considered equivalent. The authors considered the modifications of the target and trajectory as optional, Plan B. On the day of surgery, after the fusion of MRI with stereo tomographic images, the initial MRI definitions were always used to define the stereotactic coordinates applied to the patient. The modifications proposed by the FGATIR image on the stereotactic target were used for a new trajectory only when the clinical results of intraoperative stimulation were not satisfactory. ***Results***. The final targets were corrected in all patients where the difference indicated by the FGATIR sequences was observed, to avoid unwanted effects or to achieve improvement of stiffness, and tremor in the limbs contralateral to the stimulation. Plan B, with plans corrected by FGATIR, was used as the better option in the 13 patients where there was a difference from the initial planning. ***Conclusions***. The identification of the optimal target in the GPi was significantly improved by also using FGATIR images when compared to standard T1-weighted and T2-weighted images alone. All methods of anatomical targeting provide satisfactory GPi localization, but a combination of methods offers the best correlation with the optimal trajectory and final target, improving the efficiency of the surgery and the outcomes, in addition to reducing the risk of collateral damage.

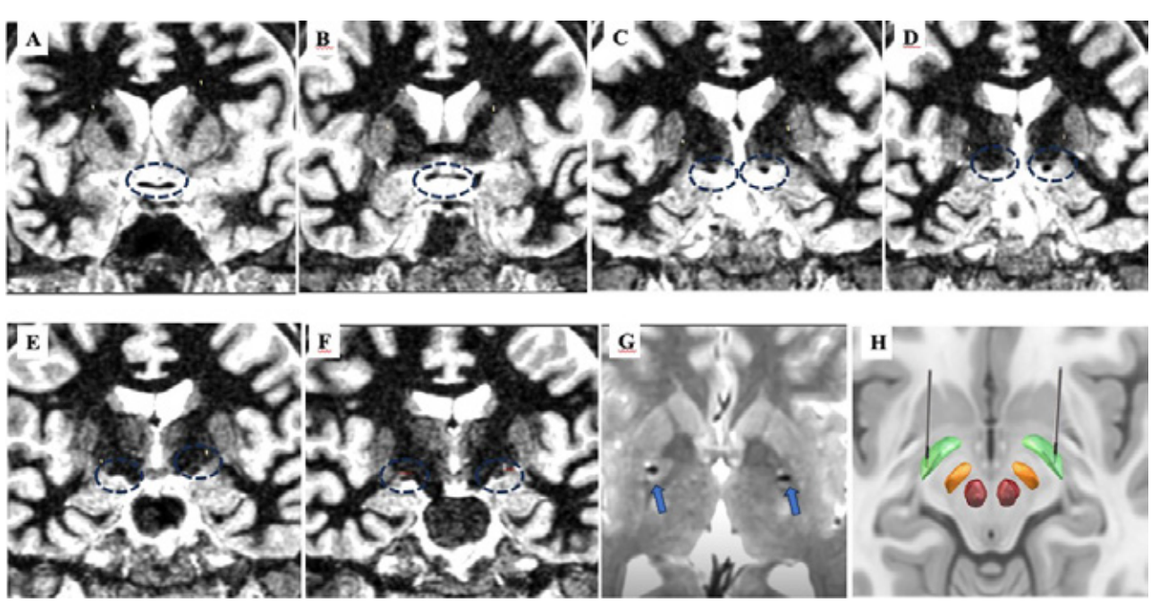


Figure 1. identification of the optic tract, reference in locating the medial and ventral limits of the GPi (MRI FGATIR sequence). A)-optic chiasm, B)-optic tracts and the anterior commissure, C,D,E)- optic tracts marked in the dotted circle, F)- relationship of the optic tracts with the marked GPi target, G)- MRI of the GPi electrodes , H)- reconstruction map of electrodes positioned on the GPi

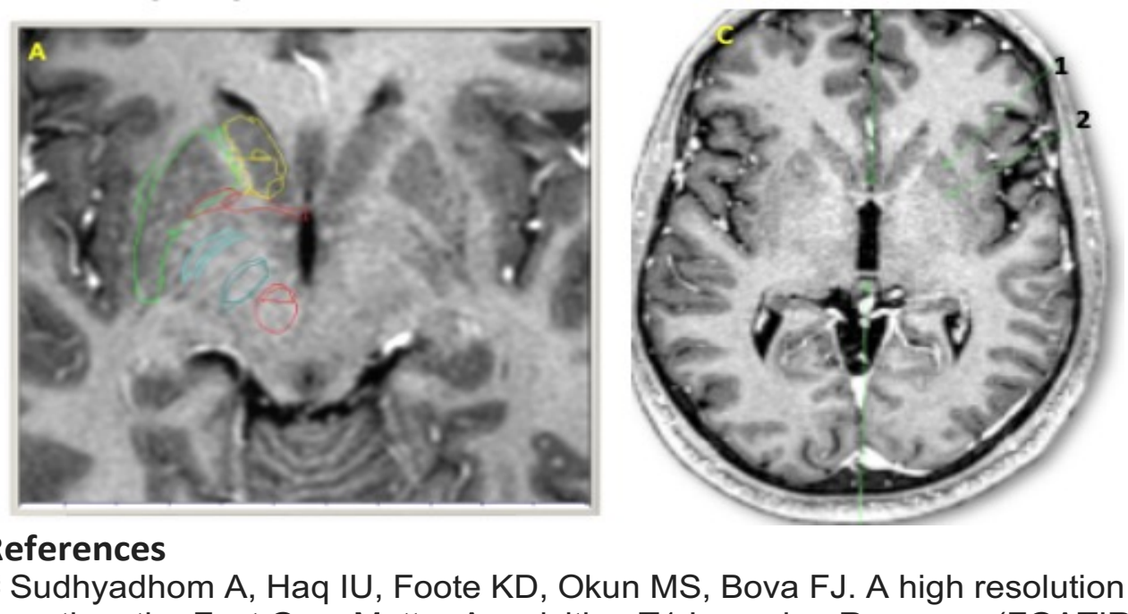


Figure 2. Preoperative axial imaging for surgical planning of pallidotomy on 1.5T MRI as a stereotactic map (A and B), showing the boundaries of the globus pallidus internus (GPi) on T1 (C) and T2 (D) weighted images (arrows: 1 - putamen; 2 - lamina medullaris lateralis; 3 - globus pallidus internus)

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Michael Schulder, Akash Mishra, Antonios Mammis, Andres Horn, Alexandre Boutet, Patric Blomstedt, Stephan Chabardes, Oliver Flouty, Andres M. Lozano, Joseph S. Neimat, Francisco Ponce, Philip A. Starr, Joachim K. Krauss, Marwan Hariz, Jin Woo Chang; Advances in Technical Aspects of Deep Brain Stimulation Surgery. *Stereotact Funct Neurosurg* doi.org/10.1159/000529040

Código.: 4DMS

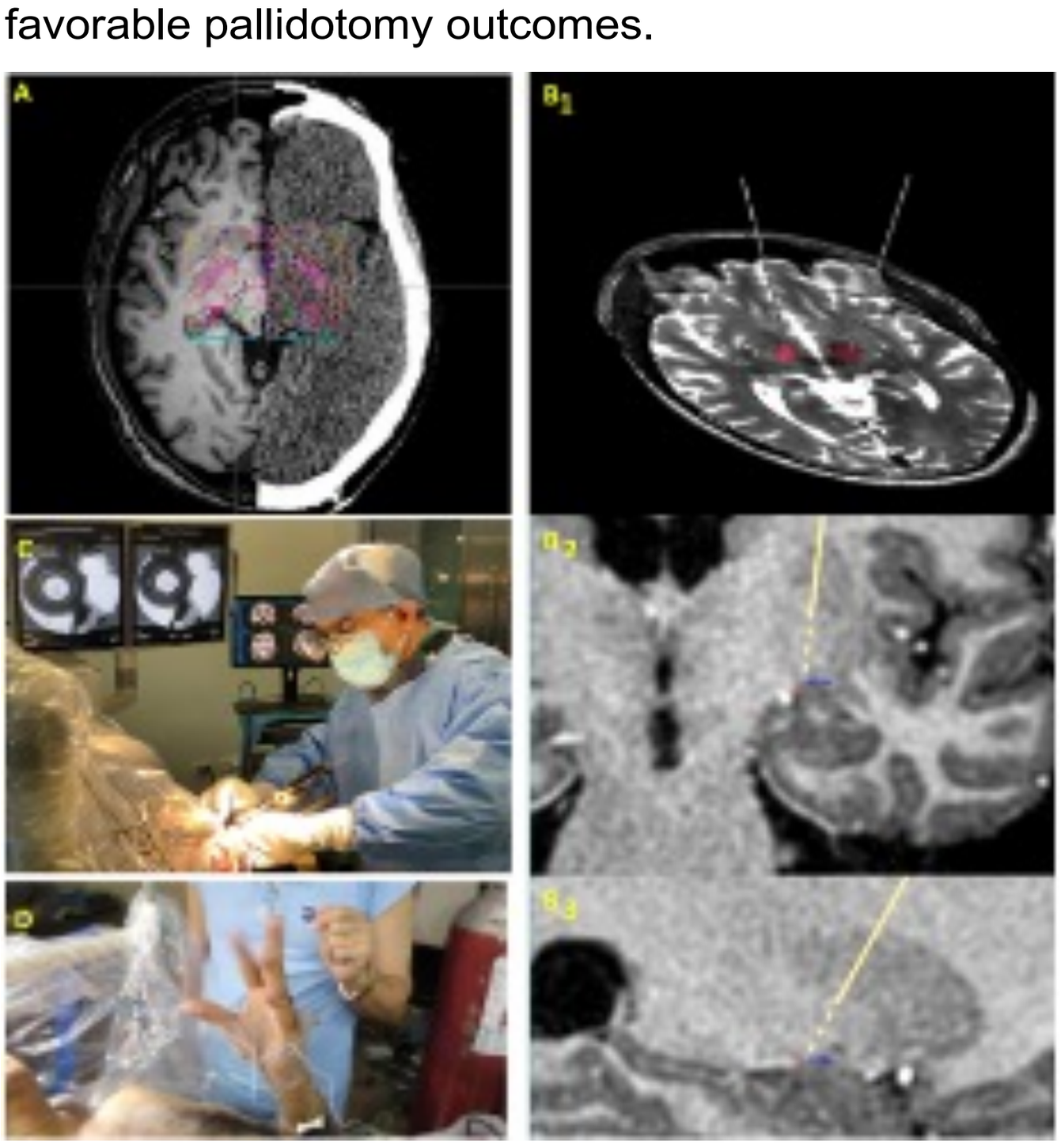
PALLIDOTOMY: PRIORITIZING PATIENT NEEDS IN THE CLINICAL RENAISSANCE AMID MODERN ADVANCES

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Objective. Deep Brain Stimulation (DBS) has emerged as one of the most important surgical techniques in the field of neurology in the past decades. Pallidotomy still represents a viable alternative for Parkinson disease (PD) symptoms treatment and has several important advantages, including a decreased need for access to specialists and clinical follow-ups, improved affordability, and a lower infection, producing high long term success rates and low morbidity rates. *Background.* Pallidotomy is recognized as effective for treating the symptoms of Parkinson's disease and can be an alternative patient not suitable for DBS, but never as a simple DBS replacement. *Methods.* Unilateral posteroventral pallidotomy was done in 83 patients (35 women, 48 men). They had predominantly unilateral symptoms with dominant dyskinesia, akinesia, and rigidity. All patients were evaluated by means of Unified Parkinson's Disease Rating Scale (UPDRS), Hoehn and Yahr Staging, and Montreal Cognitive Assessment (MOCA) and quality of life in Parkinson's Disease (PDQ39). Mean duration of PD was 13yr (range 6-17yr). After unilateral pallidotomy, 51(63%) patients underwent contralateral pallidal DBS or pallidotomy 5,8 years later (range 3-7 yr). Mean follow-up was 2.6 years (range 2-3 yr) after second surgery, pallidal lesion or DBS, contralateral to initial pallidotomy. *Results*. UPDRS off motor scores were 54 $^{+/-}$ 2 preoperatively and a 31 $^{+/-}$ 6 at last follow-up ($P < 0,02$). Tremor, rigidity, and bradykinesia of limbs remained improved more significantly contralateral to pallidotomy than contralateral to DBS ($P < 0,044$ vs. $P< 0,41$). Dyskinesia scores improved more markedly contralateral to pallidotomy than contralateral to DBS. Four patients exhibited moderate dysarthria and one moderate nonreversible dysphonia, after second surgery. Overall, 68% of patients had a good or excellent outcome at PDQ39 scores compared with the patient's preoperative condition. *Conclusions*. After pallidotomy there was a statistically significant improvement on quality of life. Symptoms contralateral to pallidotomy improve more than symptoms contralateral to the more recent pallidal DBS, despite visits to optimize and adapt DBS parameters. The most important step when considering lesion or DBS surgery is proper patient selection: Dyskinesias or dystonia are the dominating symptoms, especially if unilateral. Careful selection of appropriate candidates is crucial for favorable pallidotomy outcomes.



Patient Selection Unilateral Pallidotomy

Exclusion criteria

1) Biological Age
2) Hoehn and Yahr stage 5
3) Psychosis
4) Physical disorder

1) Severe dysphagia or dysphasia
2) overriding problem is postural instability
3) "on" period–related freezing of gait

MOCA scale examination score of 22 or less

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Código.: 4DMT

Sweetspot analysis in Deep Brain Stimulation for Parkinson's Disease

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Introduction: Within treatment options for Parkinson's disease (PD), Deep Brain Stimulation (DBS) has been approved for treatment in advanced stages of the condition. Small variations in electrode localization and stimulation parameters (SP) can produce different outcomes attributable to intrinsic large cortical and subcortical connections of targets. The optimization of stimulation involves the activation of therapeutic subregions, while avoiding the stimulation of adverse effect related subparts. The description of "sweetspots" inside targets allowed better personalization of DBS therapy for PD. Lead-DBS has emerged as a valuable tool capable of providing both radiological and simulated data about an implanted DBS leads.

Objective: To describe the sweetspots for DBS stimulation in PD patients using the Matlab toolbox Lead-DBS 3.0.2.

Methods: Anatomical lead localization was performed coregistering preoperative head MRI to late postoperative head CT scan. Electrode localization was validated manually. Normalization of head MRI (using T1-weighted sequence) to standard space (MNI152 NLIN 2009b) was used to segment the targets using the atlas DISTAL. Manual inspection and refinement of segmented targets was conducted using T2-weighted sequence (for STN) and FGatir sequence (for GPi). Volume of tissue activated (VTA) was generated using open-source simulation DBS protocol OSS-DBS with the latest SP set on follow-up. Sweetspot results were generated using group analysis toolbox and displayed using probabilistic anatomical atlases (DISTAL Atlas).

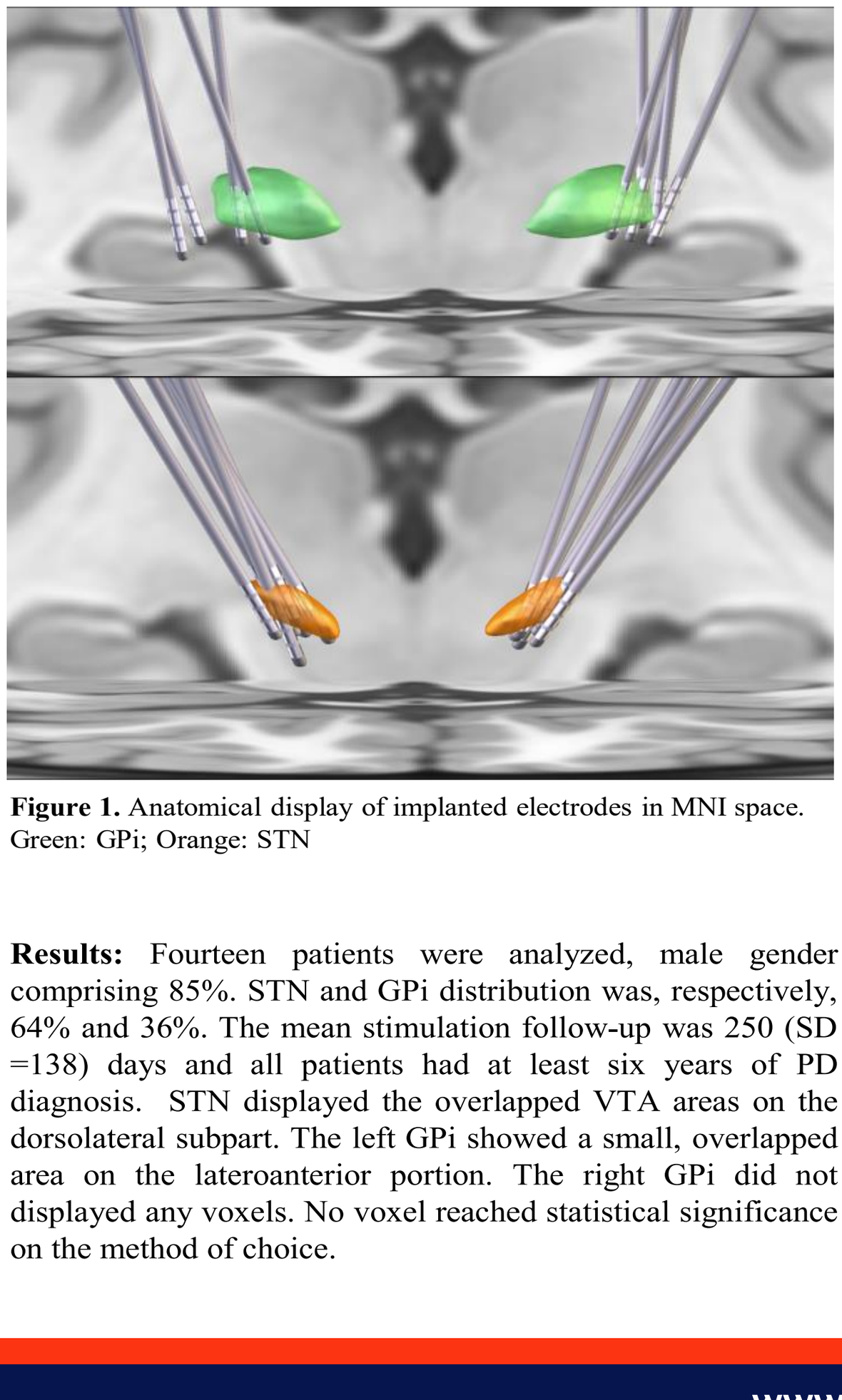


Figure 1. Anatomical display of implanted electrodes in MNI space. Green: GPi; Orange: STN

Results: Fourteen patients were analyzed, male gender comprising 85%. STN and GPi distribution was, respectively, 64% and 36%. The mean stimulation follow-up was 250 (SD =138) days and all patients had at least six years of PD diagnosis. STN displayed the overlapped VTA areas on the dorsolateral subpart. The left GPi showed a small, overlapped area on the lateroanterior portion. The right GPi did not displayed any voxels. No voxel reached statistical significance on the method of choice.

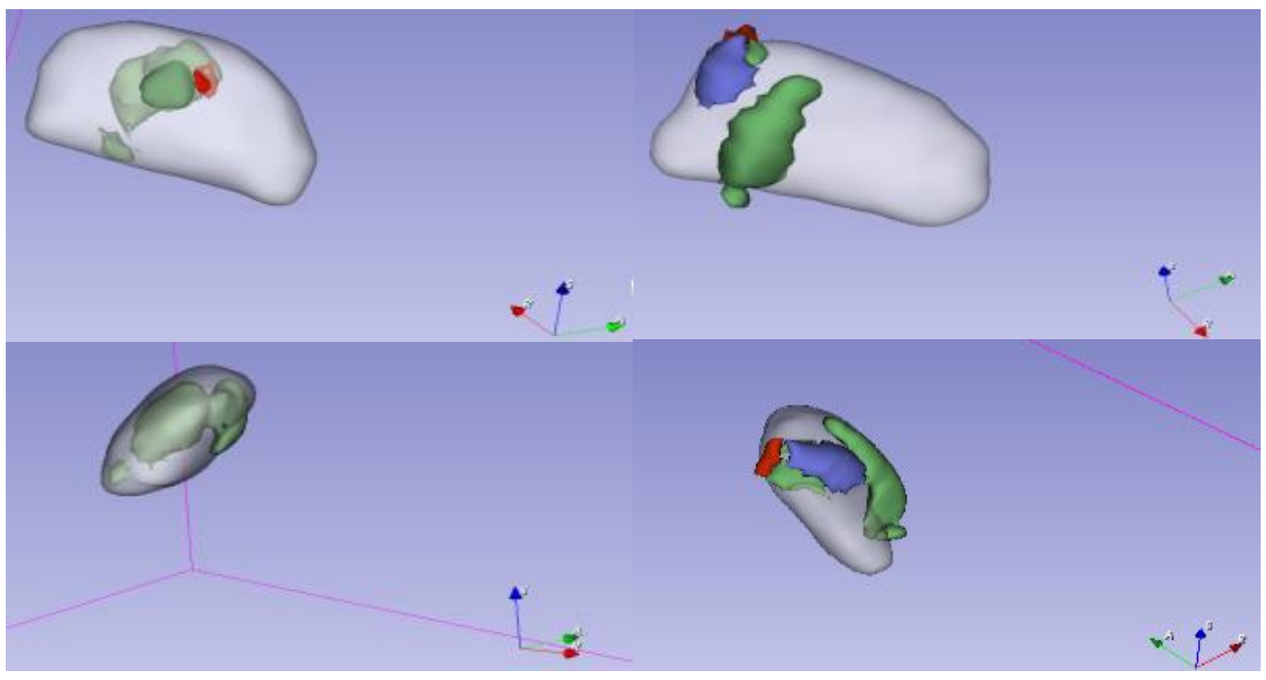


Figure 2. 3D Atlas with STN sweetspots. Different colors represents ranges of probability of STN stimulation. On the right STN: 1) Green 0-10% 2) Blue 11-20% 3) Red 21-30%. On the left STN: 1) Green: 0-25% 2) Red: 51-60%

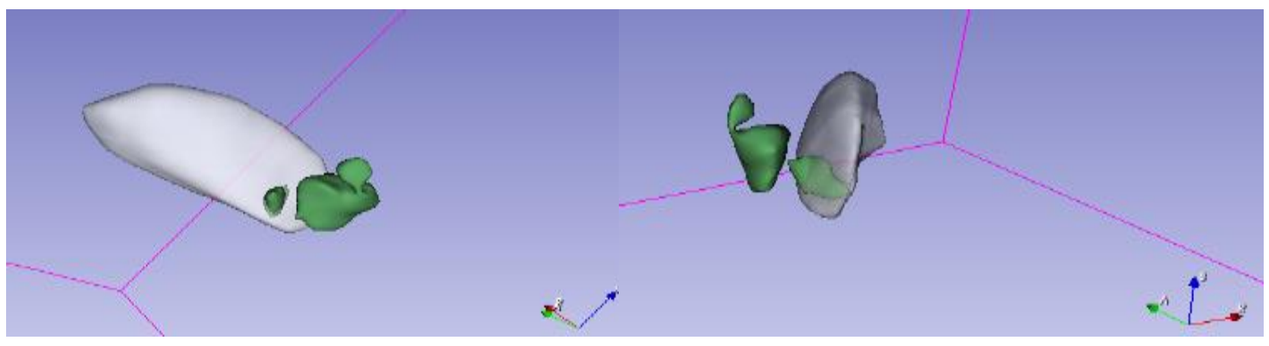


Figure 3. GPi sweetspots. Overlap occurred only on the left GPi, on a 75% probability range. There were no voxels on the right GPi.

STN displayed the overlapped VTA areas on the dorsolateral subpart. The left GPi showed a small, overlapped area on the lateroanterior portion. The right GPi did not displayed any voxels. No voxel reached statistical significance on the method of choice.

Conclusion: Lead-DBS toolbox proved to be a useful tool to localize and simulate VTA. STN sweetspots were in line with previous literature, localizing the dorsolateral subnucleus. Laterality differences can be explained by SP and electrode localization. Conclusions about GPi were hindered due to low sample size. Sweetspot normalization by clinical improvement and a bigger sample size are possible improvements for future studies.

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Código.: 4DMV

COMPARISON OF CLINICAL FACTORS RELATED TO PNEUMOCEPHALUS ON PARKINSON'S DISEASE PATIENTS SUBMITTED TO BILATERAL DBS LEAD IMPLANTATION

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INTRODUCTION

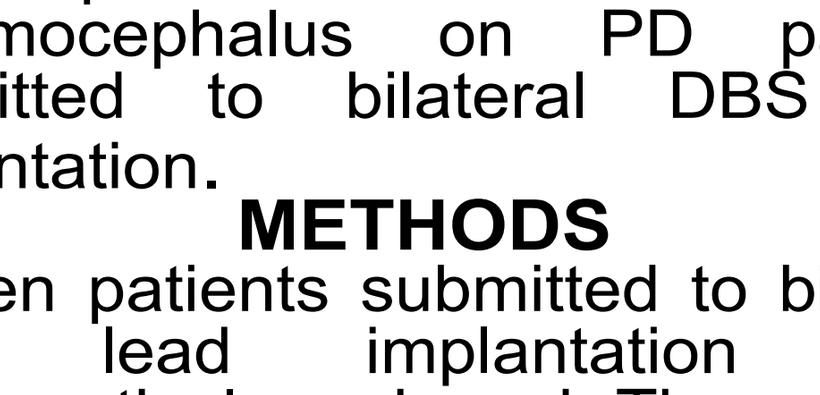
Deep Brain Stimulation (DBS) is na established treatment for Parkinson's disease (PD). Pneumocephalus is a recognized source of error in this procedure, but the factors that contribute to its formation are still a matter of debate. Understanding the sources of pneumocephalus, and consequently brain shift, are important steps towards higher accuracy lead implantations and to avoid electrode repositioning surgeries.

OBJECTIVES

To compare clinical factors related to pneumocephalus on PD patients submitted to bilateral DBS lead implantation.

METHODS

Sixteen patients submitted to bilateral DBS lead implantation were retrospectively reviewed. The software JASP was used to analyze statistics and a $p<0.05$ was used to establish statistical significant.
The image below demonstrates how the brain volume (A) was obtained in FreeSurfer, the air volume (C), and the intracranial volume (D) in 3D Slicer. Image B is a CT scan of the patient.



RESULTS

Table 1 - Unvariate analyses of predict variables for pnemocephalus formation

Variables	Sperman	p
Target	0.127	0.578
Gender	-0.248	0.267
Procedure Time	0.167	0.426
Brain Volume	-0.221	0.422
Age	0.006	0.875

Table 2 - Pacients demographic

	Age (Years)	Average Time of Illness (Years)	Procedure Time (min)	Brain Volume (mL)	Pneumocephalus Volume (mL)
Missing	0	0	2	0	0
Mean	55	14	384.6	1134.6	18.5
Std. Deviation	7.3	4.6	42.6	128.2	15.3

*N = 16

Table 1 demonstrates that there was no statistical significance among the analyzed variables. Multivariate correlation analysis showed no statistically significant result.
Table 2 shows the descriptive results found, in addition to this,the frequency found for STN as a target was 56,3% and for GPi was 43,8%.

CONCLUSION

No statistically significant correlation between pneumocephalus and clinical data was found on this report. Some previous studies showed brain atrophy and other factors related to brain shift. The results of this report might indicate that previously reported factors, are related to confounding factors not investigated yet. Limitations to this study include low sample size and extrapolation to a larger clinical set of patients that demands further studies.

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Código.: 4DMW

PERI-ELECTRODE EDEMA AFTER DBS IMPLANTATION: CASE REPORT AND LITERATURE REVIEW

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INTRODUCTION

Deep brain stimulation (DBS) is a neurosurgical technique increasingly present worldwide, and currently widely used in the treatment of Parkinson's disease (PD), essential tremor and dystonia. Complications such as hemorrhage, infection, ischemic infarction and fracture of a component may occur after its implantation, with peri-electrode edema being a rarely reported complication - infection is its main differential diagnosis.

CASE REPORT

We report a case of a 70-year-old male patient with a previous diagnosis of idiopathic PD who underwent DBS implantation in the bilateral subthalamic nucleus (STN) after a thorough preoperative evaluation. There was a good clinical evolution of postoperative motor symptoms, however, during 30 days after hospital discharge, family members noticed a fluctuating picture of disinterest. In a return consultation, apathy was noted on his part. Subjected to brain magnetic resonance imaging, hyperintensity was noted in T2 and FLAIR sequences, in peri-electrode topography at bilateral white matter, without restriction to diffusion, and without contrast enhancement.

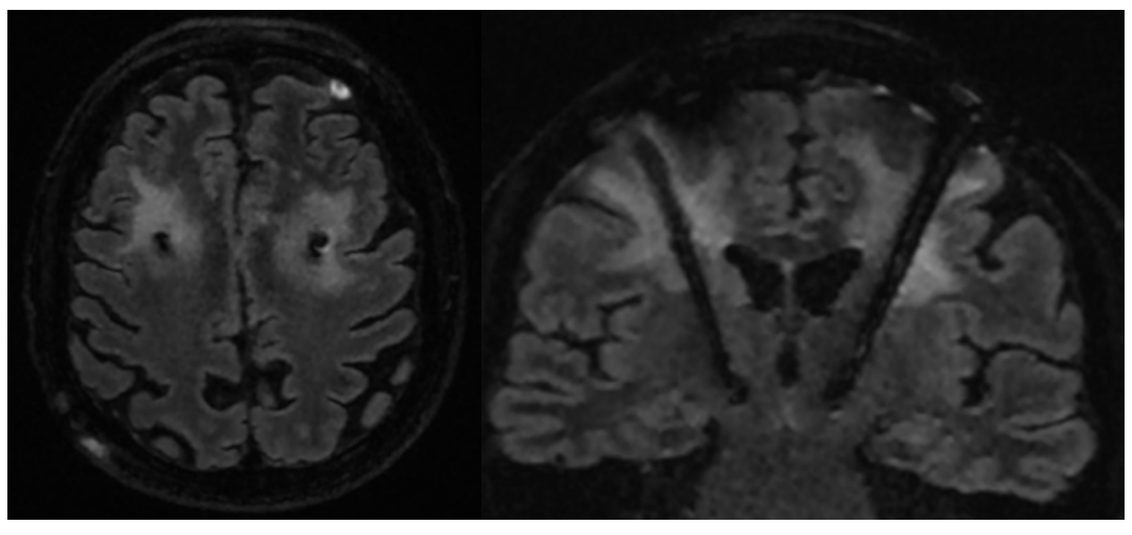


Figure 1 and 2: Post-operative MRI in T2-FLAIR sequences, axial and coronal, respectively.

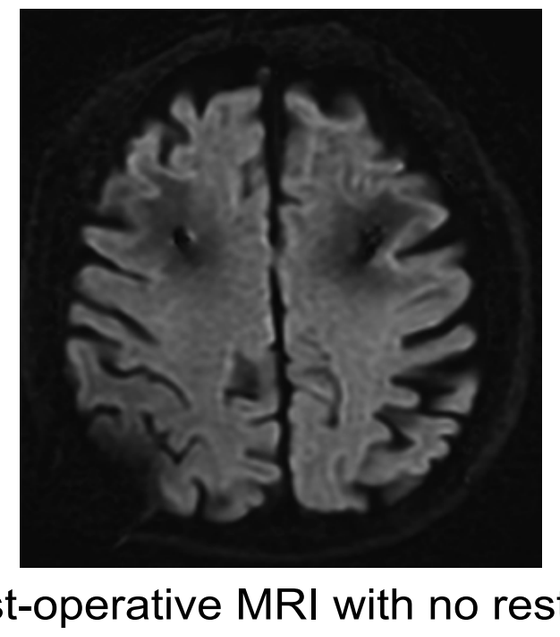


Figure 3: Post-operative MRI with no restriction on DWI sequence.

Serum tests showed no evidence of infection, surgical wounds didn't appear inflammatory or infectious, and DBS device impedances was normal. Treatment with dexamethasone began at the time of diagnosis (accumulated dose of 120 mg, divided into decreasing progression over 15 days), evolving with symptomatic improvement. Patient currently awaiting new neuroimaging.

DISCUSSION AND CONCLUSION

The occurrence of peri-electrode edema is considered a rare occurrence, it usually occurs in the first weeks after the procedure and, in general, is asymptomatic. There is still no evidence on the cause of edema, with some etiologies being assumed such as infection, cortical venous thrombosis, intraoperative microhemorrhage due to the microelectrode recording (MER), inappropriate immune reaction or reaction to the hardware. One possibility is the breakdown of the blood-brain barrier due to microtrauma of the MER and electrode placement. The prognosis of peri-electrode edema is good and usually resolves within a few weeks. Initial treatment is conservative, and corticosteroids may be added for a variable period of time, such as dexamethasone, which accelerates radiological resolution. Removing the hardware should be reserved for cases of infectious processes after failure of antibiotic therapy or in cases of peri-electrode edema refractory to initial or progressive management.

REFERENCES

Código.: 4DMX

UNILATERAL PALLIDOTOMY AS A THERAPEUTIC OPTION FOR PATIENTS WITH PARKINSON'S DISEASE AND BILATERAL DYSKINESIA: CASE STUDY

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OBJECTIVE

To assess unilateral pallidotomy as a surgical alternative for Parkinson's Disease (PD), emphasizing improvements in contralateral motor symptoms and ipsilateral dyskinesia. It also explores its feasibility in developing countries with limited access to Deep Brain Stimulation (DBS) due to cost and follow-up challenges.

METHODS

A descriptive study at Hospital Angelina Caron that involved four patients undergoing right unilateral pallidotomy from September to November 2023. Initial clinical assessments focused on dyskinesia, and post-surgery improvements were documented, showing reduced dyskinesia bilaterally and enhanced control of motor symptoms like bradykinesia, rigidity and tremor.

RESULTS

Significant improvements occurred in both contralateral and ipsilateral dyskinesia, positively impacting other motor symptoms. Previous studies confirm pallidotomy's effectiveness in treating PD motor symptoms, likely due to internal globus pallidus (GPi) connections with motor cortical areas. Pallidotomy, offering advantages over DBS, necessitates fewer additional procedures and less regular follow-up. It improves patients' Hoehn and Yahr stage, although not assessed here, however it is important to consider that it's irreversible and may require revision surgery for post-procedure adjustments.

Compared to DBS, pallidotomy is three times more cost-effective, making it a potentially effective and economically viable option for advanced PD patients, reducing both direct and indirect costs.

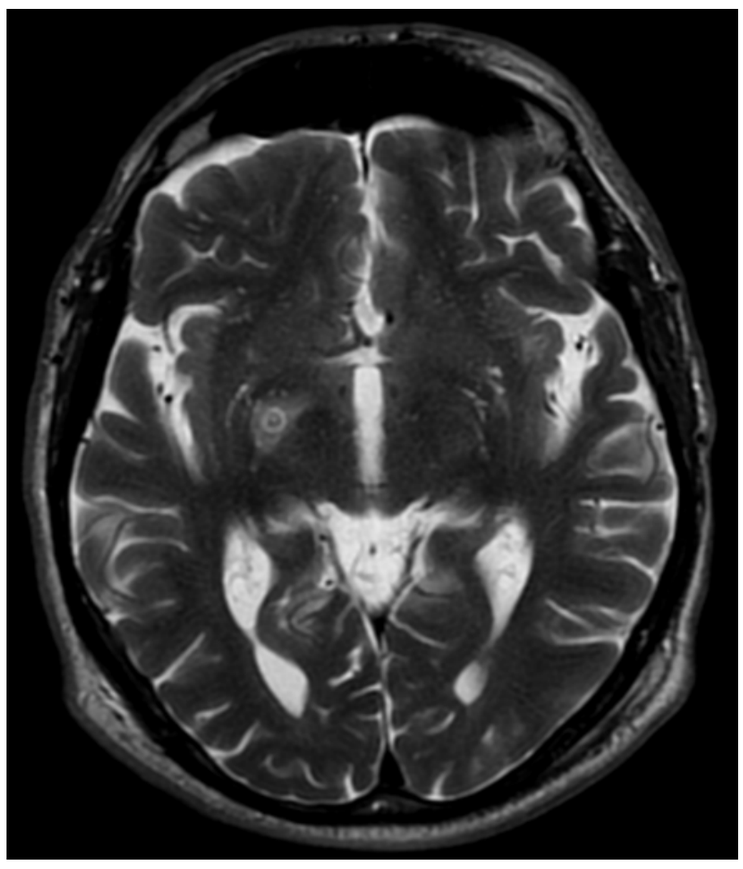


Figure 1: 1st post-op axial T2 weighted MRI showing lesional area.

CONCLUSIONS

Pallidotomy effectively treats advanced PD motor symptoms specially bilateral dyskinesia by influencing GPi connections, outperforming DBS in cost-effectiveness and requiring fewer procedures. Despite positive implications for disease progression, it is necessary to consider pallidotomy's irreversibility and potential for revision surgery. Its notable cost advantage makes it an economically viable option for advanced PD treatment, especially in areas with limited DBS accessibility.

REFERECES

Código.: 4DMY

BILATERAL DISKINESIA INDUCED BY UNILATERAL STN-DBS STIMULATION – A CASE REPORT

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May 1st to 4th, 2024 Florianópolis-SC

Case Report

A 47-year-old, right-handed, male, was diagnosed with Parkinson's Disease (PD) at age of 37. Ten years later he presented advanced PD with freezing, motor fluctuation and disabling dyskinesias, worse on the left side, despite optimized drug treatment. After clinical evaluation, surgery was recommended. During DBS implantation on the first side (right STN) the bipolar stimulation of the distal contact (contact 0, cathode; contact 1, anode) at 2 mA induced severe dyskinesia manifesting with chorea, initiating on the right inferior limb, and extending to the left inferior limb and superior limbs, bilaterally. The phenomenon ceased with interruption of stimulation. On the left side the stimulation of distal contacts induced only contralateral dyskinesias at lower limb. Within one year of surgery, the patient became independent for daily activities, both ON and OFF medication. Levodopa induced dyskinesias were reduced when compared to pre-operatively.

Discussion

STN-DBS-induced dyskinesias frequently occurs during intraoperative testing of the electrodes, manifests contralaterally and are indication of optimal positioning.

Ipsilateral effects related to unilateral DBS implantation are extensively described in literature and raised the interest regarding the possible bilateral connections between basal ganglia in PD patients[1], which pose a challenge from the physiology standpoint since these functional connections defy the classic model of basal ganglia circuitry.

Research evolving PD patients demonstrated a coherence between beta-wave oscillations in STNs, suggesting a direct reciprocal connection between this region in both hemispheres, or an indirect connection, cortically or subcortically mediated[2]. The ipsilateral cortical role of interference with beta-waves of STNs has been described before[3] and a coherence between STN and contralateral motor cortex has demonstrated to be significant, even if lower to the ipsilateral counterpart. It raised the hypothesis of the cortex having an influence in bilateral synchronization, and that PD patients could present abnormally broader connections in comparison to normal individuals[4], which could explain the bilateral therapeutic and adverse effects of unilateral STN-DBS, although this needs to be proven.

Final Comments

This case report enriches the discussion regarding basal ganglia circuitry and its bilateral connections, contributing to a better knowledge of the impact of deep brain stimulation in its pathways.

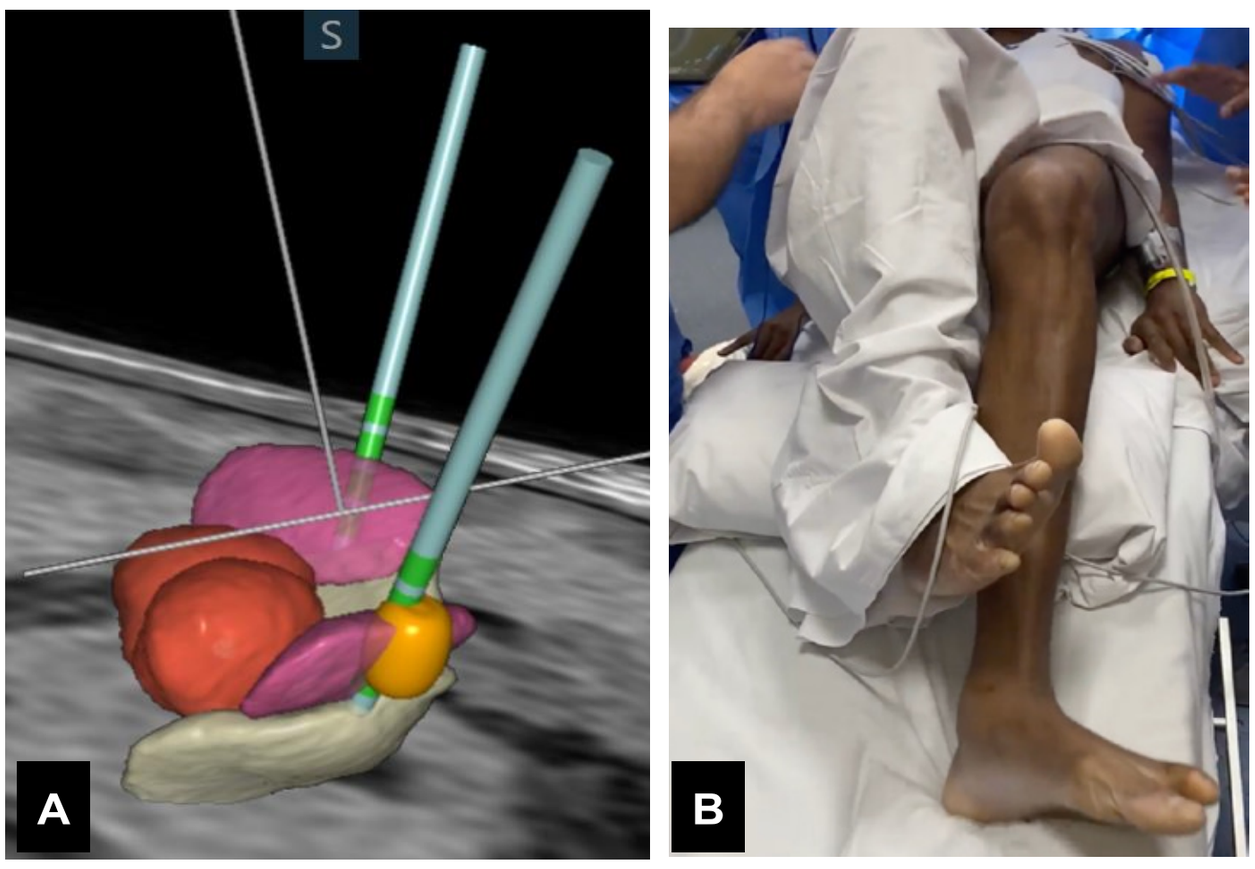


Fig.1 :A- 3D reconstruction of the DBS electrode final position. Pink: STN. Yellow: stimulation area. B- Bilateral dystonic movements during unilateral intraoperative stimulation.

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Código.: 4DN4

ELECTRODE IMPLANTATION SURGERIES FOR BRAIN STIMULATION IN BRAZILIAN PUBLIC HEALTH SYSTEM – ARE THEY UNIVERSALLY PERMORMED?

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INTRODUCTION

Parkinson's disease is the most common form of parkinsonism and has a high prevalence, approximately 1% of the population over 60 years of age.
For a long time, the only option to treat this disease was surgical intervention.

However, with levodopa, in 1968, there was a reduction in neurosurgical treatment, but it still remained indicated in some cases. In 1987, brain stimulation began to be used, with good results. Initially, patients with Parkinson's can be treated in Primary Care, but referral to specialists is justified in complex cases or to obtain a differential diagnosis.

OBJECTIVES AND GOALS

Search public data on brain electrode implant surgery authorizations and map distribution.

METHOD

This is an observational and cross-sectional study of consolidated data on the number of electrode implant surgeries for brain stimulation in the SUS user population in 2023.

The DATASUS Hospital Admission Authorization was used, and filters were applied by Region (Norte , Nordeste, Centro-Oeste, Sudeste and Sul) and Procedure (IMPLANTE DE ELETRODO PARA ESTIMULACAO CEREBRAL).

To contextualize, the literature review was integrative, with advanced research on the Virtual Health Library platform, with Medline and LILACS databases, the combined terms “eletrodo” and “Parkinson”; and “estimulação cerebral” and “Parkinson.” The inclusion was of works produced in Brazil, between 2020 and 2024.

RESULTS

80 electrode implant surgeries were performed, distributed across 4 in the Northeast, 53 in the Southeast, 21 in the South and 14 in the Midwest. No data was found in the North region **(Figure 1)**.

Some interesting intra-regional data: In the Southeast, Minas Gerais, with 20 million inhabitants, and São Paulo, with 44 million inhabitants, both had 21 brain stimulator implant surgeries; In the South, Paraná, with 11 million inhabitants, and Santa Catarina, with 7 million inhabitants, this ratio was 3:6; In the Center-West, Goiás, with 7 million inhabitants, and the Federal District, with 2 million inhabitants, the ratio was 1:13.

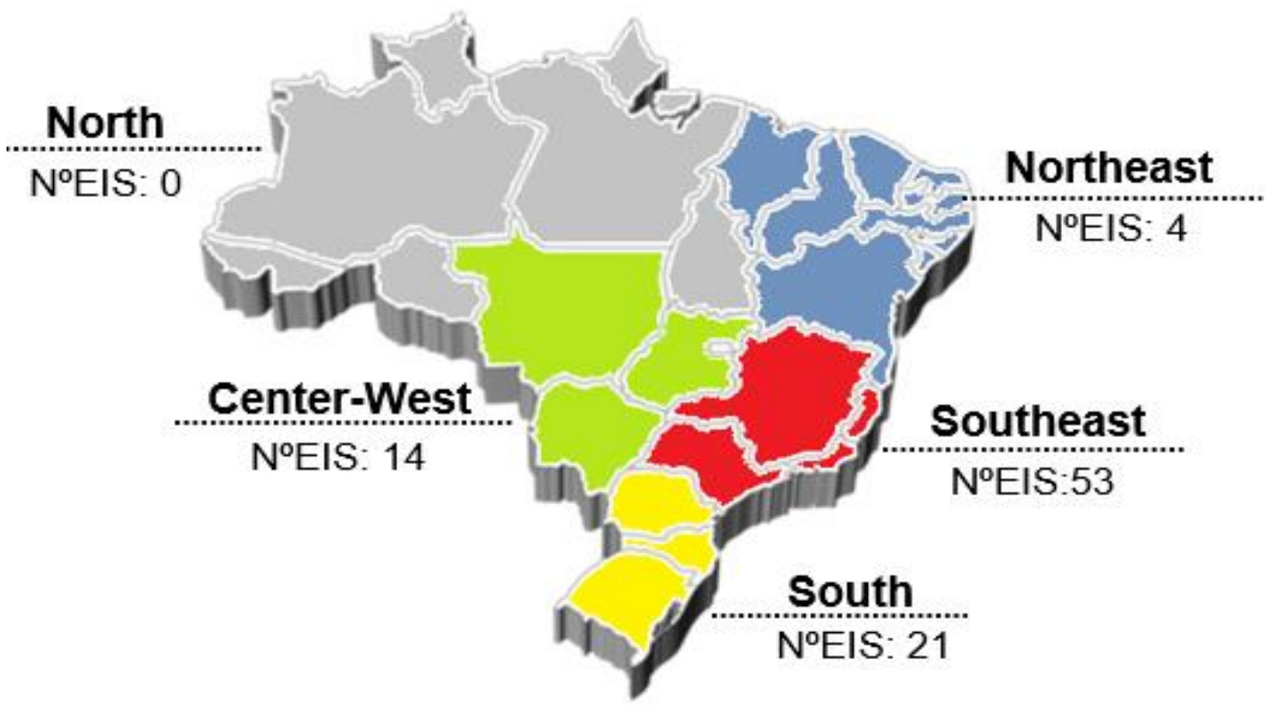


Figure 1 – Number of procedures authorized and permormed by region in 2023 - *(NºEIS – Number of Electrode Implantation Surgery per region).*

CONCLUSIONS

Thus, there is a heterogeneous distribution of these surgeries in Brazilian regions that are not directly proportional to the number of inhabitants; these differences extend to intraregional scenarios.

Finally, it is known that the real numbers may be different, as the main limitation of this work is to only use data from DATASUS.

Código.: 4DNH

COST ASESSMENT OF PALLIDOTOMY IN A PUBLIC HOSPITAL IN PARANA

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BACKGROUND

Resources are finite and need to be well managed in a healthcare system, especially a public one. The development of new technologies can improve the quality of treatment, but on the other hand, it makes treatment substantially more expensive. Therefore, it is necessary to evaluate the best solutions in terms of cost-benefit.

Parkinson's disease still has no cure, and can vastly affect the quality of life of patients. Initial treatment starts with medication, however the surgical approach emerges as a promising option where conservative treatment has reached it's limit.

There are two main techniques: deep brain stimulation (DBS) and pallidotomy. DBS is the more expensive and technological demanding option, while pallidotomy is less expensive option, however it's causes an irreversible lesion.

OBJECTIVE

Analyze the costs of surgical therapeutic forms of Parkinson's disease treated in a Hospital with public and private services during the 1st year of it's implementation in 2023.

METHOD

Evalluating the cost for each of the four patients treated surgically for Parkinson disease, based on the remuneration provided by the public health system and the supplementary health system, using value in Reais.

RESULTS

Two patients cumulative cost at the end of hospitalization were R$ 3,203.08, while the other two were R$ 1881.06 each. These fours patients were treated with pallidotomy.

PATIENT	COAST
1	R$ 1881,06
2	R$ 1881,06
3	R$ 1601,54
4	R$ 1601,54
Average cost per patient	**R$ 1741,30**

Table 1 showing cost per patient and the average per patient.

CONCLUSION

The comparative economic analysis revealed that the four patients who underwent pallidotomy had the most cost-effective treatment compared to DBS.

Código.: 4DNN

How Local Field Potential Could Improve DBS Programming in Tourette`s Syndrome – Case Report

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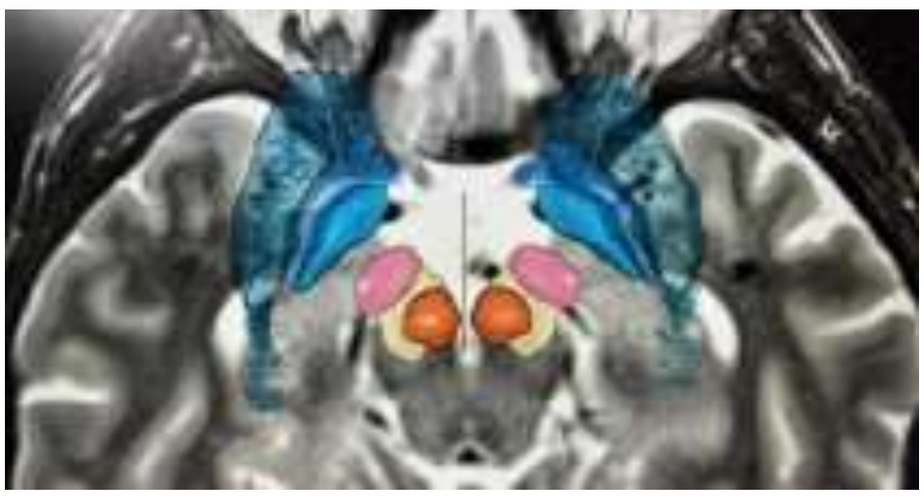
Tourette Syndrome (TS) is a neurobehavioral disease characterized by multiple motor and phonic tics usually associated with behavioral comorbidities. In severe cases the tics occur multiple times a day and this scenario can develop functional and psychosocial disability. The pathophysiology is multifactorial and involves hyperactivity in dopamine brain circuits. When symptoms impair quality of life, treatment options include psycho and behavioral therapies, medication and in the refractory cases Deep Brain Stimulation (DBS) may be an useful option.

Approximately 5% of TS patients are refractory to conservative treatment and can be candidates for DBS. Many target sites for stimulation have been previously described, most commonly centromedian-parafascicular-thalamic complex, anterior globus pallidus internus (aGPi) and nucleus accumbent, with improvement from 30-90% on symptoms. Due to lack of consensus on target selection, local field potential (LFP) recording could increase the rate of success while monitoring electrical biomarkers and evaluating effects of stimulation. The most studied biormarkers on Tourette Syndrome are theta (oscillation on 5-7Hz) and alpha (8-12Hz) bands, which were shown as consistent signature of tic onset.

Clinical Case:

A 51 year-old woman was diagnosed with TS since 28 years old. Her symptoms were vocal and motor tics several times a day with throat clearing, grunting, sniffing, coughing and repeating words or phrases, refractory to psychological therapy and medication. Other symptons such as anxiety, obsessive compulsive disorder and attention deficit were at good control.

She was submitted to a single staged bilateral DBS implantation at the anterior globus pallidus internus – Percept PC neurostimulator (Medtronic, USA) – Fig. DBS parameters were Amplitude 3.0 mA (left aGPi) and 3.5 mA (right aGPi), pulse width 90 µs, frequency 130 Hz, with monopolar stimulation on the most ventral electrodes in both hemispheres according to the LFP finding.



During the 1 year follow-up the tics improved by 53% in Yale Global Tic Severity Scale (YGTSS). Sum of Motor and Phonic Tic Severity Scales were 47/50 before surgery and 22/50 after DBS implantation.

Discussion and Conclusion:

There is growing evidence that DBS reduces the impacts of Tourette Syndrome. Since the disease is multifactorial and there are differences between patients' symptoms, there is not one specific target for all patients. Patients with predominant motor tics could benefit from aGPI stimulation. The identification of biomarkers of the disease through local field potential monitoring, such as theta and alpha bands, is key to determine the best position for lead placement intraoperatively and for subsequent programming, as shown in the clinical case. Further effort is necessary for the development of closed loop DBS technologies based on local field potential for Tourette Syndrome treatment.

NON-INFECTIOUS, SYMPTOMATIC AND ENHANCING GADOLINIUM PERI-LEAD EDEMA AFTER DEEP BRAIN STIMULATION FOR PARKINSON'S DISEASE: A CASE REPORT

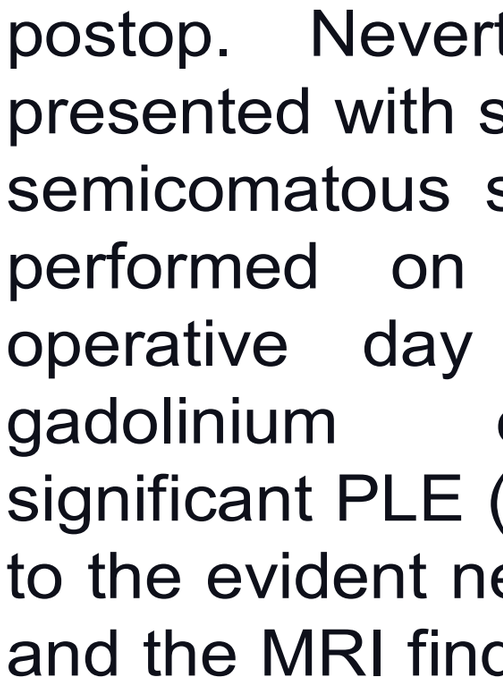
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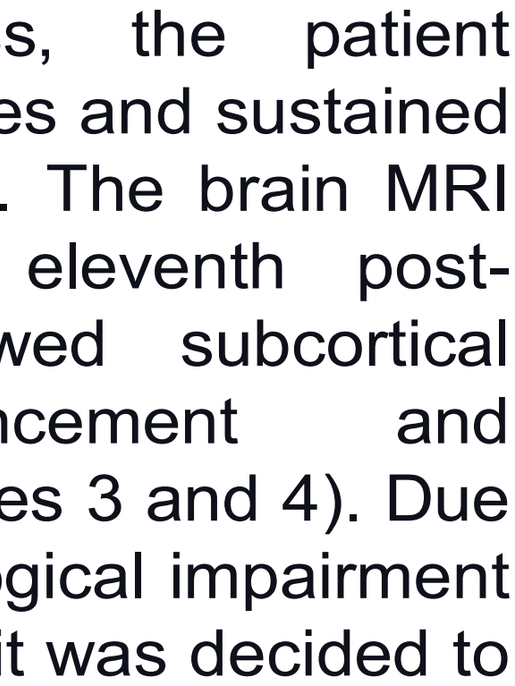
Case presentation

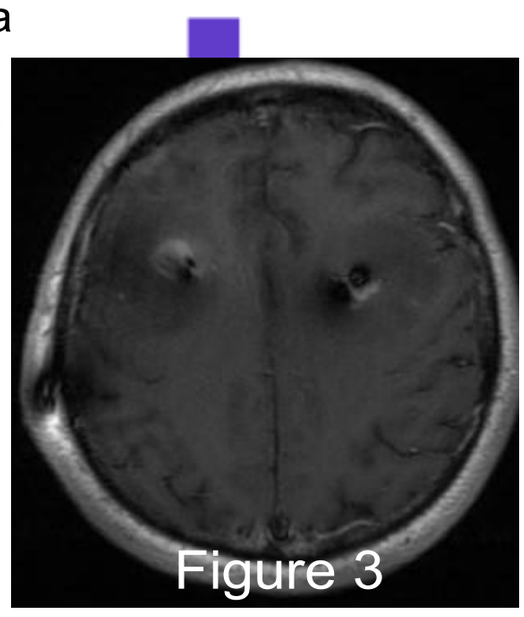
We report a case of a 69-year-old male presenting PD for 8 years who underwent bilateral STN DBS under MER. He was previously cured from kidney cancer.

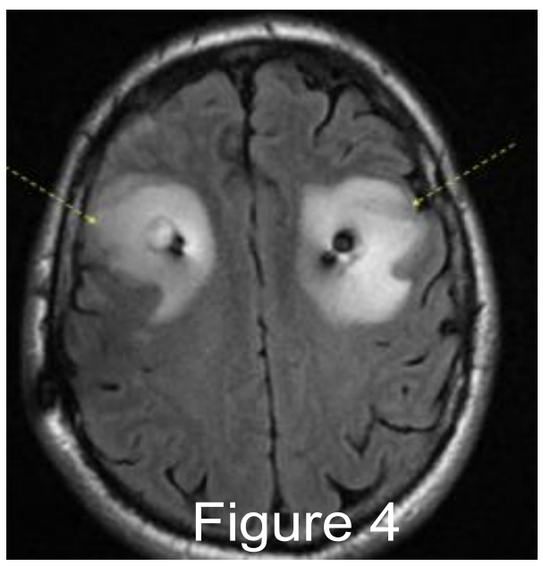
A CT scan was performed 12 hours after surgery (Figure 1). At the 2nd postoperative day he presented one episode of 38.1 degres fever and elevation of inflammatory markers. Diagnosed with broncoaspiratory pneumonia, he was treated for five days with intravenous antibiotics. A CT scan performed on 5th postoperative day showed a more evident peri-lead edema (Figure 2). He was discharged at the sixth postop day.

At the tenth postoperative day, a marked worsening on parkinsonism was noticed. A new CT scan showed additional impairment of PLE and antibiotics were introduced. Due to the progressive edema, it was decided to add dexamethasone in the 11th postop. Nevertheless, the patient presented with seizures and sustained semicomatous status. The brain MRI performed on the eleventh post-operative day showed subcortical gadolinium enhancement and significant PLE (Figures 3 and 4). Due to the evident neurological impairment and the MRI findings it was decided to remove the leads. Microbiological analysis showed no signs of infection. The patient improved markedly.


Figure 1


Figure 2


Figure 3


Figure 4

Discussion

Infections following DBS are usually superficial and do not extend toward the implant trajectory.[1-3] MRI findings associated with PLE are unspecific and the possibility of perilead abscess could not be promptly excluded. The underlying pneumonia may have contributed to a proinflammatory state. The idea of an immunological component has been presented before in the literature[4]

PLE is most likely underreported as a complication of DBS implantation.[5,6]. Even though current literature warrants restraint in dealing with cases of PLE to avoid precocious DBS explantation[4], the declining neurological status in the setting of ambiguous imaging findings proved to be too much risk. Furthering the understanding of this complication may be helpful.

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Código.: 4DNQ

LOCAL FIELD POTENTIAL-GUIDED PROGRAMMING FOR DEEP BRAIN STIMULATION IN PARKINSON'S DISEASE: CASE REPORT

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CASE PRESENTATION

We report a 55-year-old right handed man, with a history of 9 years of presenting diagnosed Parkinson's disease (PD). Disease onset with resting tremor in his right arm, with stiffness and slower gait and. Over time the symptoms progressively worsened and the patient presented with motor fluctuation, work limitations and worsening quality of life. After optimization of medication, levodopa equivalent daily dose (LEDD) of 950 mg comprised Levodopa/Benzerazide and Pramipexole, and with medically-refractory motor fluctuations, the Levodopa Challenge test was then proposed to see DBS eligibility with improvement of 74%. Bilateral STN DBS was performed using SenSight directional leads. DBS programming with the BrainSense technology was performed. The BrainSense Survey showed beta peak obtained from 2 different segments at levels 1A 1C and LFP frequency registered at 20.51Hz. Beta band was reduced when increasing to 1,0mA. After activating the group D (2,5mA, 60µs,125Hz), some improvements such as reduction of Levodopa to 50 mg 4 times a day, tremor and dyskinesia were seen.

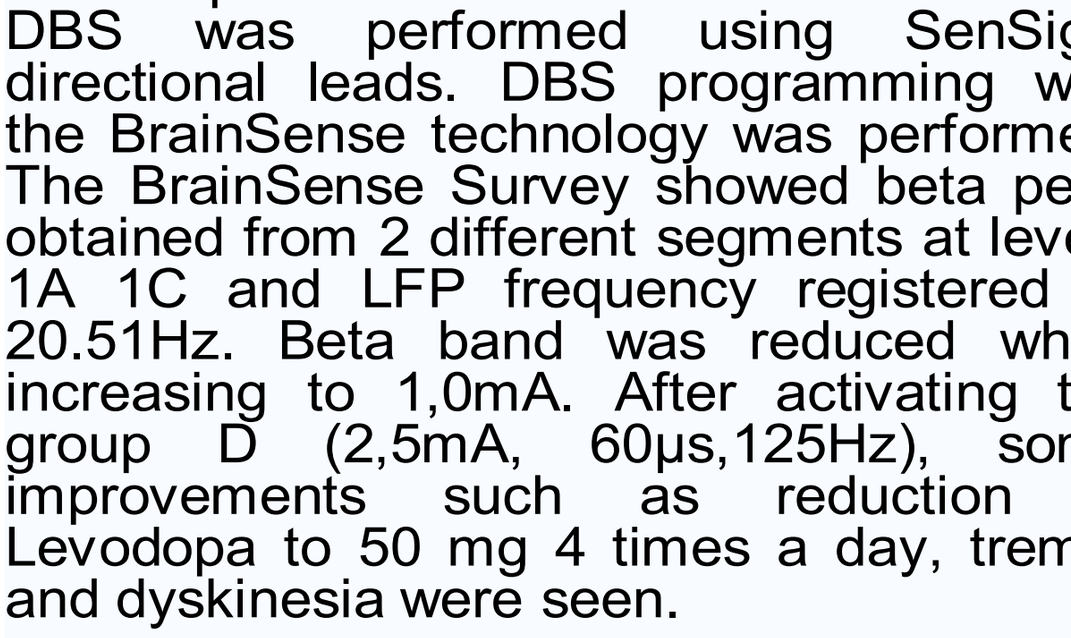


Figure 1- Beta peak demonstration at segments 1A-1C

DISCUSSION

BrainSense technology was designed to capture brain signals (local field potentials-LFP's) using the implanted DBS lead while delivering therapeutic stimulation, inside or outside the clinic. This hardware allows to continuously evaluate the brain signals while stimulation and in a personalized way allows events capturing medication, symptoms, or side effects , data-driven treatment and adjust as patient needs evolve.

During the follow-up the patient recorded tremors events using the LFP snapshots. Through the timeline and LFP chart, the neurologist was able to evaluate the exactly day and time of the event and it was possible to adjust some stimulation parameters.The BrainSense technology through the timeline, LFP chart, event LFP snapshots and device usage allow to more effectively manage the adjustment of medication dosage, addition or change of medication type, adjustment of patient limits and more secure modification of stimulation parameters.



Figure 2- Timeline demonstrating the events

CONCLUSION

In this case report, we demonstrated the effectiveness of the BrainSense technology usage and how it can benefit the patient and improve their quality of life. This device can reduces programming time and the visits to the doctor's office for lead DBS programming and through continuous monitoring of the patient, allows the doctor and the patient more safety in adjustment of medications and PD management. Beta titration is a tool to potentially avoid STN over stimulation based on suppression of pathologic beta bands.

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TRABALHOS APROVADOS

Sub-eixo temático:

Epilepsia



16º CBENF
Congresso Brasileiro de Estereotaxia e Neurocirurgia Funcional
1º a 4 de maio de 2024 Florianópolis-SC

Código.: 4DNA

VAGUS NERVE STIMULATION FOR EPILEPSY: A SYSTEMATIC LITERATURE REVIEW

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INTRODUCTION

Epilepsy is a chronic neurological disorder characterized by recurrent epileptic seizures, which affects approximately 50 million people worldwide, according to the WHO. Treatment predominantly involves antiepileptic medications, or for individuals with drug-resistant epilepsy, surgical intervention to remove the epileptic focus.However, not only is surgery not indicated in many cases, but there is also a risk of developing complications in 20 to 30% of patients. Therefore, Vagus Nerve Stimulation (VNS) presents itself as an alternative option for patients who are not candidates for surgery.

OBJECTIVE

The objective of this study is to identify the efficacy of VNS and determine which type of epilepsy demonstrates a greater response to VNS.

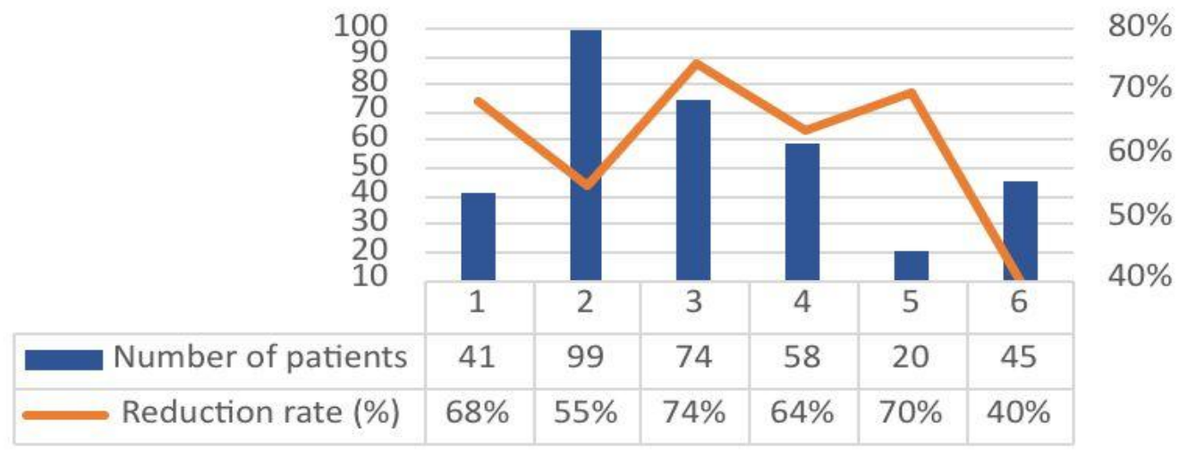
METHODS

The search strategy followed the PRISMA (Preferred Reporting Items for Systematic reviews and Meta-Analyses) guidelines and was performed with the following equation: "(VNS OR VAGUS NERVE STIMULATION) AND EPILEPSY". Only articles published within the last 10 years were considered. Searches were conducted using 4 databases: PubMed, Cochrane library, LILACS and SciELO. Duplicate entries and studies that did not specify how many patients underwent the procedure were removed, leaving a total of 6 studies with 337 patients.

RESULTS

Patients who underwent VNS implantation, including those under four years of age, experienced a decrease in epileptic seizures, with over 20% achieving complete seizure cessation and some, a reduction in antiseizure medication. Across multiple studies, there was a median seizure reduction of over 80%, with a minimum reduction of 40%. Patients with multifocal epilepsy had a median reduction of 80% in seizure frequency. However, vascular malformations and Lennox–Gastaut syndrome were associated with a less favorable response to VNS, while over 70% of those with focal impaired awareness seizures (FIAS) experienced a reduction in FIAS frequency. Similarly, patients with generalized tonic-clonic seizures had over 50% reduction in seizure frequency. Other seizure semiologies did not show significant reduction from baseline, although many did decrease. Additionally, one study assessed improvements in cognitive, language, and motor functions.

Number of patients and rate of reduction* in epileptic seizures after, at least, 1 year of VNS per article



	1	2	3	4	5	6
Number of patients	41	99	74	58	20	45
Reduction rate (%)	68%	55%	74%	64%	70%	40%

CONCLUSION

The results show a considerable efficiency of VNS in the treatment of epilepsy. Considering most studies, there was an average reduction of 60% in epileptic seizures, in addition to improvements in cognition, language and motor skills. Multifocal epilepsy showed the greatest response to VNS. However, further studies are necessary to understand why some seizure semiologies do not respond adequately to treatment.

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THE ROLE OF DIFFUSION WEIGHTED IMAGING-BASED TRACTOGRAPHY IN POSTERIOR CALLOSOTOMY

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Case presentation

We present an illustrative case of a 22-year-old patient presented with a history of absence seizures and drop attacks since the age of five. Despite pharmacological management with cannabidiol, topiramate, phenytoin, lamotrigine and carbamazepine, seizures persisted. Subsequent treatment with vagus nerve stimulation resulted in partial improvement, yet the patient continued to experience 1-2 daily disperceptive seizures, drop attacks, and absence seizures. Video electroencephalography (VEEG) revealed bilaterally synchronous epileptic discharges, while magnetic resonance imaging (MRI) showed no focal alterations. Given the ongoing seizure burden, specially from drop attacks, posterior callosotomy was indicated. Medtronic StealthViz tractography processing software allowed tensor computation and the generation of directionally encoded color mapped sequences. For motor fibers crossing the corpus callosum, the volume of interest (VOI) was defined within the primary motor-premotor cortex and exported as an hybrid image for neuronavigation. The patient underwent posterior callosotomy in semi-sitting position with post-operative tension pneumocephalus that required drainage with no other complications. Pos-operative MRI showed total interhemispheric motor cortex disconnection. With six months follow-up, the patient completely recovered from drop attacks while focal motor seizures persisted.

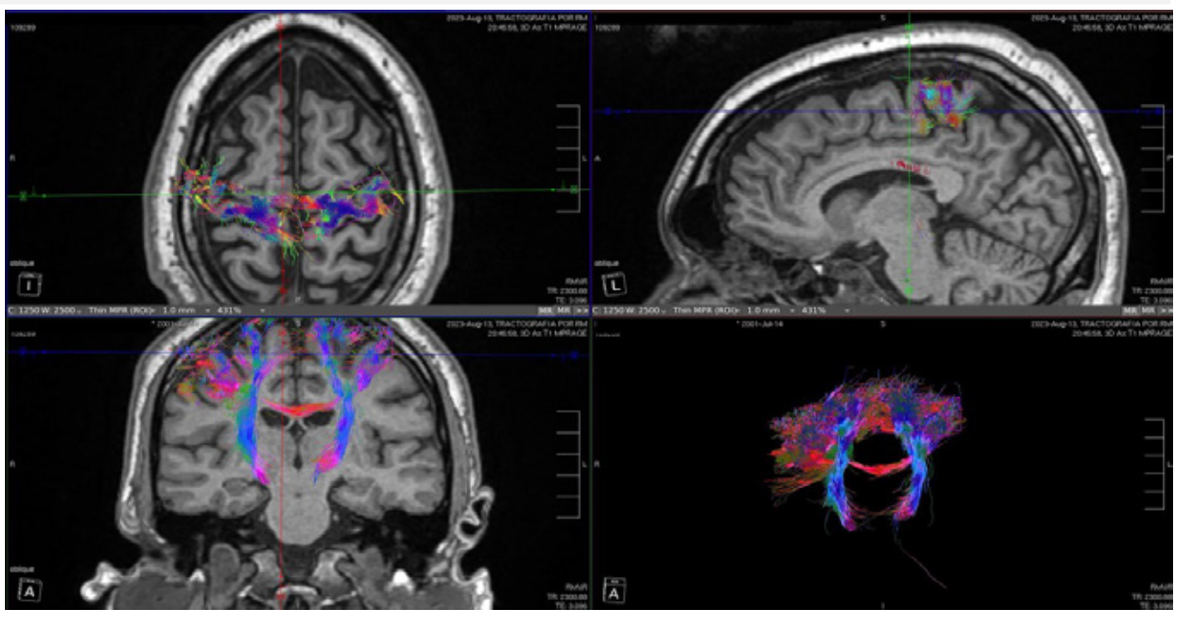


Fig. 1 Medtronic StealthViz tractography processing software tracking motor fibers to the corpus callosum.



Fig. 2 Patient positioning in semi-sitting position for selective posterior callosotomy.

Discussion

Posterior callosotomy is a surgical procedure indicated for patients with medically refractory epilepsy with drop attacks. The rationale for this procedure is that the origin of drop attacks are bilateral synchronization of ictal discharges from the premotor and primary motor cortex controlling axial and lower limb muscles. Diffusion weighted imaging (DWI) based tractography offers a promising technique for preoperative planning and intraoperative guidance in such cases. When tracking this fibers we can perceive that they cross through the mid to posterior half of the callosum, supporting the idea of selective posterior callosotomy sparing prefrontal connectivity. By accurately mapping the callosal fibers, surgeons can tailor the surgical approach to maximize therapeutic efficacy while minimizing postoperative complications. In this case, DWI-based tractography facilitated the identification of the optimal site for callosotomy, ensuring maximal disruption of interhemispheric connections associated with drop attacks.

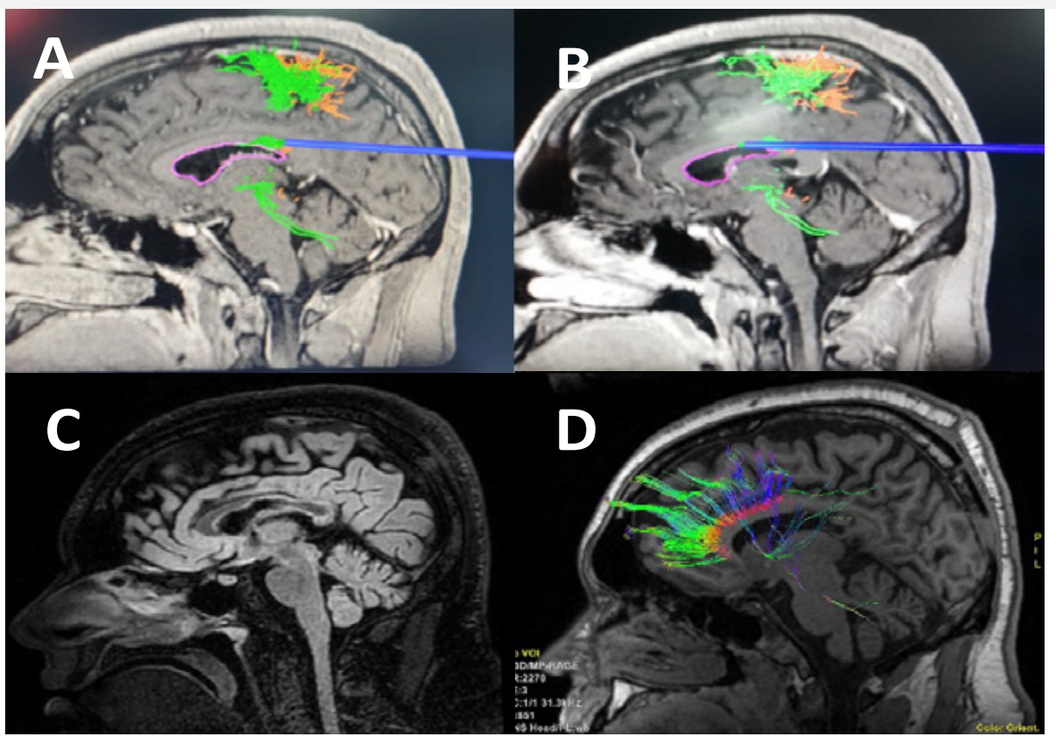


Fig. 3 Intraoperative neuronavigation images before (A) and after (B) callosotomy guided my tractography. Pos-operative MRI (C). Pos-operative MRI tractography showing no connection between motor cortex and the posterior aspect of the corpus callosum (D).

Conclusion

Diffusion weighted imaging-based tractography plays a crucial role in the preoperative planning and intraoperative navigation of selective posterior callosotomy. By enhancing our understanding of the brain's structural connectivity, this technique enables more precise targeting of epileptogenic networks, ultimately improving surgical outcomes and quality of life for patients.

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STEREOELECTROENCEPHALOGRAPHY AND DEPTH-ELECTRODES FOR PHARMACORESISTANT EPILEPSY: a review of the experience with 43 consecutive adult and pediatric patients and 359 electrodes in a single Brazilian teaching hospital

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16th CBENF Brazilian Congress of Stereotaxic and Functional Neurosurgery
May 1st to 4th, 2024 Florianópolis-SC

Introduction

Stereoelectroencephalography (SEEG) is an **invasive method to guide potential ressective surgery in the context of epilepsy**, allowing for the three-dimensional recording of electrical signals originated from the depths of the brain and thus generating anatomoelectroclinical correlation of seizures. The **establishment of the SEEG paradigm in a Brazilian public health system teaching hospital and epilepsy center** allowed for continuous development and refinement of the technique, however the whole range clinical data of this process has not yet been systematically evaluated.

Objectives

- **To review all the SEEG and depth-electrodes insertion surgeries** for both adult and pediatric patients, including further SEEG-guided radiofrequency (RF) thermocoagulation, to determine safety and clinical data obtained from the invasive epilepsy studies

Methods

- Retrospective review of **43 consecutive adult and pediatric patient's clinical records and images** from a single Brazilian teaching hospital
- Informed consent was obtained from the adult patients and from the parents of the children submitted to surgery. Institutional ethical board clearance was obtained for this study

Results – Part I

- Between 2015 and 2024 a **total of 47 procedures for SEEG or depth electrode implantation were performed**, for 30 adult and 13 pediatric patients
- **A total of 359 depth-electrodes were implanted**, ranging from 1 to 18 electrodes per patient at a time
- **Age at the time of surgery** ranged from 8 to 62 years, with a **mean of 32 years**
- **No mortality** was recorded in this series, however there was **one asymptomatic intracerebral hemorrhage following the SEEG surgery**, that didn't require surgical intervention.

Results – Part II

- **Five patients underwent SEEG-guided RF thermocoagulation**, from which two had hypothalamic hamartomas
- These two patients required reoperation for electrode repositioning
- **One patient had an infection following epilepsy surgery at the same occasion** of the removal of the electrodes
- No postoperative infections were recorded for the patients that underwent **electrode removal at the OR exclusively**

Summary

Single center retrospective chart review

43 consecutive patients

47 procedures between 2015 and 2024

359 depth-electrodes

No fatalities

One intracerebral hemmorhage (non-symptomatic)

SEEG-guided RF thermocoagulation in five cases

Two cases of hypothalamic hamartoma ablation

Conclusions

SEEG surgery is safe and feasible in for patients with pharmacoresistant epilepsy in the context of the Brazilian public health system. The **adoption of SEEG-guided-RF thermocoagulation allows for further development of the electroclinical hypothesis and when needed**, for the minimal invasive **thermocoagulation of deep-seated lesions** or epileptogenic zones.

References

Access the QR code

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REFINNING GAMMA KNIFE THALAMOTOMY PLANNING WITH DIFFUSION TENSOR TRACTOGRAPHY OF PYRAMIDAL TRACT

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Case presentation

We report an illustrative case of a 79-year-old male patient with bilateral hand tremor persisting for over 20 years, predominantly affecting the left hand and worsening over the last decade. The tremor exacerbates during activities such as eating with the left hand. The patient experienced very mild improvement with propranolol and primidone. Neurological examination revealed bilateral high-frequency, low-amplitude postural and kinetic tremor in the upper limbs and mild intention tremor towards left. No bradykinesia or rigidity was observed. Due to the refractory nature of the tremor, Gamma knife thalamotomy was indicated, with the utilization of pyramidal tract (PT) tractography for precise treatment planning. Difusion Tension Imaging (DTI) sequence , employing diffusion gradients in 40 directions, was performed and coregistered with volumetric T1-weighted study. StealthViz tractography processing software (Medtronic, Colorado, USA) allowed tensor computation and the generation of directionally encoded color mapped sequences. For PT, the volume of interest (VOI) was defined within the cerebral peduncle and exported as a hybrid image. Subsequently, the combined images were integrated into Leksell GammaPlan for treatment planning. The patient underwent a left VIM thalamotomy, with a prescribed maximum dose of 140 Gy and two 4 mm gamma knife shot with block in the 6/7 and 4/8 sectors to improve shaping. Maximum dose measured was 23,5 Gy (15Gy dose in 15,2 mm3 volume and 23 Gy in 0,1 mm3). The minimum distance from the hotspot to the PT was 3,8mm laterally and 6,5mm inferiorly.

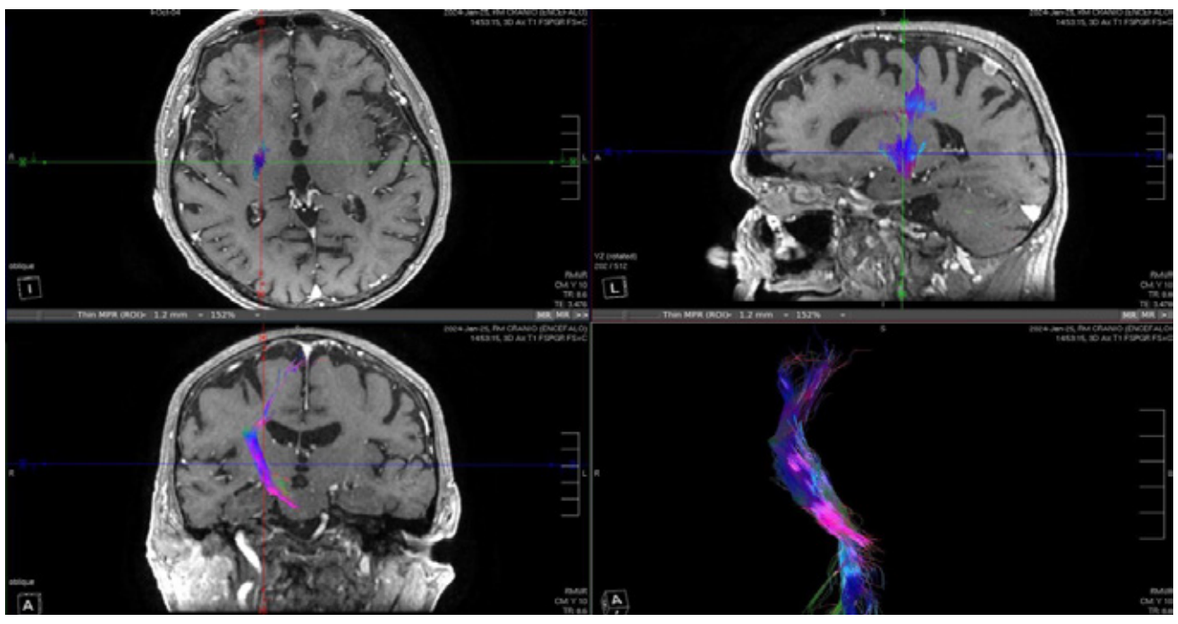


Fig. 1: Medtronic's StealthViz tractography processing software showing the pyramidal tract before exporting.

Discussion

Gamma Knife thalamotomy has emerged as a safe and effective therapeutic modality for medically refractory essential tremor, particularly in elderly or those with concurrent medical conditions with ineligibility for DBS or radiofrequency thalamotomy1. However, precise targeting of the Ventral Intermedius (Vim) thalamic nuclei is challenging due to the proximity of the pyramidal tract, compounded by the indistinct delineation of the internal capsule even with specialized sequences like FGATIR2. To overcome this challenge, we employed pyramidal tractography for Gamma Knife thalamotomy planning. This innovating approach utilizes an integrated software within the neuronavigator already used in neurosurgical procedures, thereby enhancing accessibility. Studies have reported a maximal dose to the PT associated with a risk of motor complications ranging from 15-23 Gy3. By employing this technique, the PT is readily discernible as a structural volume, facilitating accurate dose measurement and aiding in target adjustment and dose shaping.

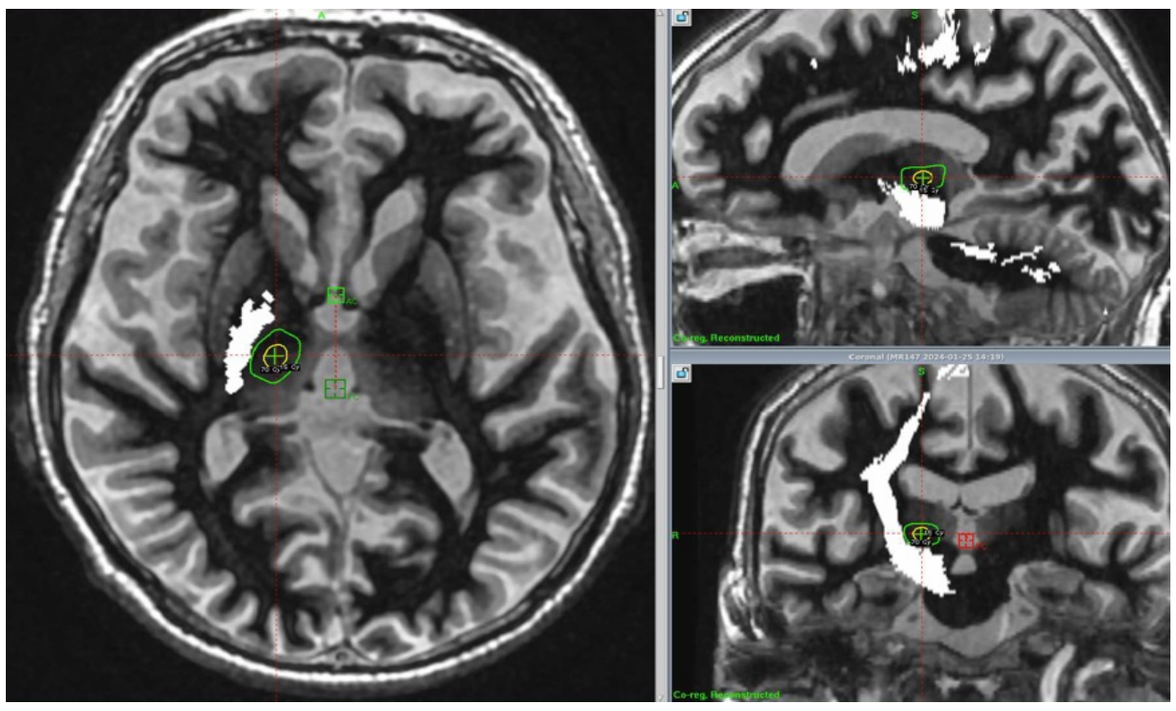


Fig. 2: Leksell GammaPlan software hybrid image (FGATIR + Pyramidal tract) showing 15 Gy and 70 Gy shaped curves.

Conclusion

Using tractography in Gamma Knife thalamotomy represents a valuable addition to the armamentarium of neurosurgical techniques for the management of essential tremor, offering a viable and safe option for patients who may not be suitable candidates for alternative therapies such as deep brain stimulation or radiofrequency thalamotomy.

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TRABALHOS APROVADOS

Sub-eixo temático:

Cirurgia do Comportamento



16º CBENF
Congresso Brasileiro de Estereotaxia e Neurocirurgia Funcional
1º a 4 de maio de 2024 Florianópolis-SC

Código.: 4DMC

Use of vagus nerve stimulation for refractory depression: Case report of the first patient in Brazil.

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Introduction:
This case report presents a patient with a five-year history of depression, experiencing recent exacerbation refractory to treatments administered by the psychiatric team. Psychiatric evaluation revealed a Beck Inventory score of 60, despite undergoing various psychological and psychiatric interventions without significant improvement. The condition had a substantial impact on the patient's quality of life, affecting both work and profession. Consequently, a left Vagus Nerve Stimulation (VNS) procedure was performed, approached via the anterior cervical region, involving dissection and identification of the vagus nerve. A spiral-shaped neural stimulator was then placed around the nerve under microscopic guidance.

Discussion:
The vagus nerve, the eleventh cranial mixed nerve, plays diverse and crucial roles. Vagus Nerve Stimulation received approval for treatment-resistant depression in 2005. While the precise role of VNS in depression treatment is not fully elucidated, it is believed to enhance synaptic transmission of norepinephrine through the locus coeruleus. VNS has been employed since 1988 for epilepsy, with other indications currently supported by limited evidence in the literature.

Final Comments:
Despite Vagus Nerve Stimulation being a procedure in use for refractory depression for 18 years, following globally accepted surgical indications, its application for this indication had not been documented in Brazil until now. A collaborative effort involving psychologists, psychiatrists, and other professionals was undertaken after conservative therapeutic failures, leading to the joint decision to proceed with the VNS procedure. This case emphas the need for the establishment of more interdisciplinary services to ensure broader access for patients to benefit from such innovative therapies.

Código.: 4DMD

"The use of neuromodulation in obsessive-compulsive disorder: Cingulotomy."

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Case Presentation:
Male patient, 38 years old, diagnosed with obsessive-compulsive disorder (OCD) for 10 years. He has undergone various treatments from different healthcare professionals without significant improvement. Unfortunately, his condition worsened over the years. The Yale- Brown Obsessive-Compulsive Scale (Y-BOCS) score was 34, categorizing his disorder as extremely severe. Interdisciplinary treatment was recommended, leading to the decision to perform cingulotomy. The procedure involved electrode placement using stereotactic techniques, resulting in three lesions on each side in the anterior region of the cingulate gyrus. Two months post-surgery, the patient showed clinical improvement with a new Y- BOCS score of 18, currently classified as moderate.

Discussion:
Cingulotomy involves lesions in the cingulate gyrus, primarily associated with emotional processes and pain regulation. Typically indicated for refractory psychiatric disorders such as depression and OCD, in this case, the patient had extremely severe OCD unresponsive to various therapies. Besides neuro-psychiatric disorders, cingulotomy can address intractable pain, particularly when the emotional-sensory component plays a predominant role.

Final Comments:
Despite the advent of deep brain stimulation, cingulotomy persists due to advantages like electrode migration risk avoidance, lower operational costs, and technical ease. Regarding Y-BOCS classification (subclinical, mild, moderate, severe, extremely severe), our patient's status changed from extremely severe to moderate within two months. However, it is crucial to note that better results are typically observed between 3 to 6 months post-surgery, leaving room for further improvement.

Código.: 4DMN

EFFECTIVENESS OF DEEP BRAIN STIMULATION AS A TREATMENT OPTION IN TOURETTE SYNDROME A NARRATIVE REVIEW

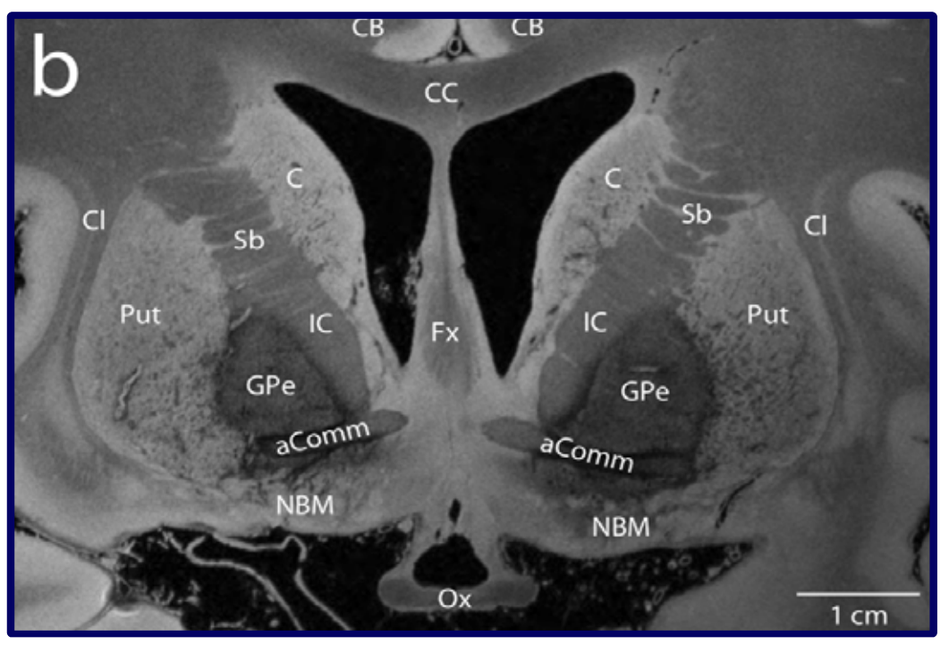
Kuriki, Breno H.[1]; Melissa S. Chiu[1]; Julia E.F. Malheiros[1]; Raissa K.D. Ikeda[1]; Maria V.C.B.[1]; Claudia B.C. Lotti[2].
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Tourette Syndrome (TS) is a complex neuropsychiatric disorder without an exact cause or cure. Symptoms correlate to vocal and motor tics and other psychiatric comorbidities, prompting a deterioration in quality of life. Despite many pharmacotherapy options, some patients are unresponsive; having no other option, Deep Brain Stimulation (DBS) may be the only alternative to mitigate this condition and ensure safety, independence, and improvement in quality of life.

The objective of this study is to analyze the indication of DBS and its clinical repercussions as a treatment for TS refractory to drug treatment.

This narrative review was carried out in Bireme's databases with the descriptors "Tourette's Syndrome" and "Deep brain stimulation", joined by the Boolean operator AND. Articles that had full text in the MEDLINE and LILACS databases, were carried out between 2017 - 2022, written in English, Portuguese, Spanish, or Italian were chosen, totaling 82 articles. Those that didn't correlate both the descriptors, used animal models, didn't address DBS as a treatment option for TS, or full text couldn't be accessed were excluded, leaving 46 articles.

The most commonly stimulated targets were the posteroventral regions of the globus pallidus interna bilaterally and centromedian thalamic nucleus, albeit there is a range of areas under study. The recommendations for DBS in TS are fairly recent and assess associated psychiatric comorbidities, severity of tics, and non-response to pharmacological treatment with or without multidisciplinary treatment. There is no minimum age to be eligible for this procedure. The keystone to post-surgical follow-up is validated scores encompassing quality of life, intensity, and severity of symptoms, and the evolution of associated comorbidities. The reviewed literature points to a more evident overall reduction in these marks after the 13th month.



1. Delineation of basal ganglia and basal forebrain neuroanatomy in a zoomed view.

Neuroanatomic abbreviations:
C = caudate; CB = cingulum bundle; CC = corpus callosum; Cl = claustrum; Fx = fornix; GPe = globus pallidus externa; IC = internal capsule; NBM = nucleus basalis of Meynert; Ox = optic chiasm; Put = putamen; Sb = striatal bridges.

INDICATIONS

FAILURE IN NON-PHARMACOLOGICAL AND PHARMACOLOGICAL THERAPIES (3 DRUG CLASSES)

HIGH SEVERITY OF MOTOR OR VOCAL TICS

TICS DEFINED AS MALIGNANT OR HARMFUL (MOTOR: SELF-HARM / 1 HOSPITALIZATION / 2 ED VISITS | VOCAL: HIGH COMPLEXITY) WITH DURATION OF AT LEAST 6 MONTHS

YGTSS SCORE ≥ 35 FOR AT LEAST 12 MONTHS

MODERATE YGTSS SCORE OR HIGH GTS-QoL SCORE FOR AT LEAST 12 MONTHS

GAF SCORE < 50 + TS TOTAL DURATION GREATER THAN 5 YEARS

DIFFERENTIAL DIAGNOSIS EVALUATION OF TICS

MULTIDISCIPLINARY EVALUATION

EVALUATION OF ASSOCIATED PSYCHIATRIC COMORBIDITIES

CORRECT TREATMENT AND CONTROL OF ASSOCIATED PSYCHIATRIC COMORBIDITIES; TICS AS THE MAIN CAUSE OF REDUCING QUALITY OF LIFE

IQ GREATER THAN 80

Deep brain stimulation is an effective short-term treatment for refractory TS, however, there is insufficient academic discourse on long-term therapeutic effects. Although it controls particular associated psychiatric symptoms and improves the patient's quality of life, this approach requires further studies to better specify its anatomical targets. Despite evidence in treating other diseases, its use in TS needs greater clarity to balance the interrelation between the neuroanatomical location of stimulation targets, their clinical responses, and side effects in long-term treatments.

References:

VENTRAL CAPSULE/VENTRAL STRIATUM DBS LOCATION, FIBERS RECRUITMENT AND CLINICAL RESPONSE IN REFRACTORY OCD

Kaito Alves Carvalho Laube[1]; Ricardo Iglesio[1]; Antonio Carlos Lopes[1]; Marcelo Q. Hoexter[1]; Lizzie Shephard[1]; Carolina Cappi[1]; Paula Ricci Arantes[1]; Euripedes C. Miguel[1]; Fabio Godinho[1].
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Introduction: Deep brain stimulation of the ventral capsule/ventral striatum (VC/VS DBS) is an emerging treatment for refractory obsessive-compulsive disorder (OCD). Several studies have shown that 40% of patients remain symptomatic after VC/VS DBS. Inter-individual variation of anatomic location of the leads is one of the factors that might explain different outcomes.

Objectives: This study aims to compare the anatomic position of the stimulating contacts between responders and non-responders and to correlate the connectivity profile with DBS-related clinical improvement.

Methods: OCD symptoms were assessed in 7 refractory OCD patients, by applying the Yale-Brown Obsessive-Compulsive Scale (Y-BOCS) before and after VC/VS DBS, at the University of Sao Paulo, Brazil. The anatomic position of the chronic stimulating contacts was reconstructed by LeadDBS 3.0 software, coregistering postoperative tomography with preoperative magnetic resonance imaging (MRI) within the MNI space. The volume of tissue activated (VTA) by the active contacts in the VC/VS region was estimated using the DISTAL Atlas (Ewert 2017) in a group analysis reconstruction. We estimated the VTA overlap in responders (n=4) and compared with the VTA overlap in non-responders (n=3), aiming to disclose anatomical differences between groups. The number of fibers coursing within each VTA, and projecting to distinct cortical areas, was estimated using the AICHA 2015 atlas. We correlated the number of projection fibers with changes in Y-BOCS score.

Results: Four patients were deemed responders, whereas 3 patients were considered non-responders after VC/VS DBS. Compared to non-responders, responders had right VTAs in a more lateral position in anterior limb of the internal capsule. The cortical connectivity with the VTA had a positive correlation with improved outcomes (considering $p<0,005$), revealing VTA fibers projecting to middle temporal cortex, inferior temporal cortex and lateral occipital cortex on the right side. Conversely, worse outcomes were correlated to left VTAs fibers projecting to right cortical areas, such as anterior insula and inferior frontal gyrus.

Conclusion: This data suggests that neuromodulation of the lateral part of the right anterior limb of the internal capsule is related to better responses after VC/VS DBS in OCD patients. Furthermore, a VTA-connectomic approach may assist future procedures, as different patterns of connectivity may relate to distinct clinical outcomes

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Código.: 4DN2

EXPLORING THE THERAPEUTIC POTENTIAL OF DEEP BRAIN STIMULATION FOR OBSESSIVE-COMPULSIVE DISORDER: A SYSTEMATIC LITERATURE REVIEW

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INTRODUCTION

The Obsessive-Compulsive Disorder (OCD) is one of the most significant psychiatric conditions. Treatment primarily involves cognitive behavioral therapy and medications such as Selective Serotonin Reuptake Inhibitors. However, for severe symptoms and individuals resistant to conventional treatment, Deep Brain Stimulation (DBS) is an option.

OBJECTIVE

Analyze and discuss the efficacy of DBS in the treatment of OCD, evaluating which brain areas respond best to electrical stimulation and the impact on patients' quality of life.

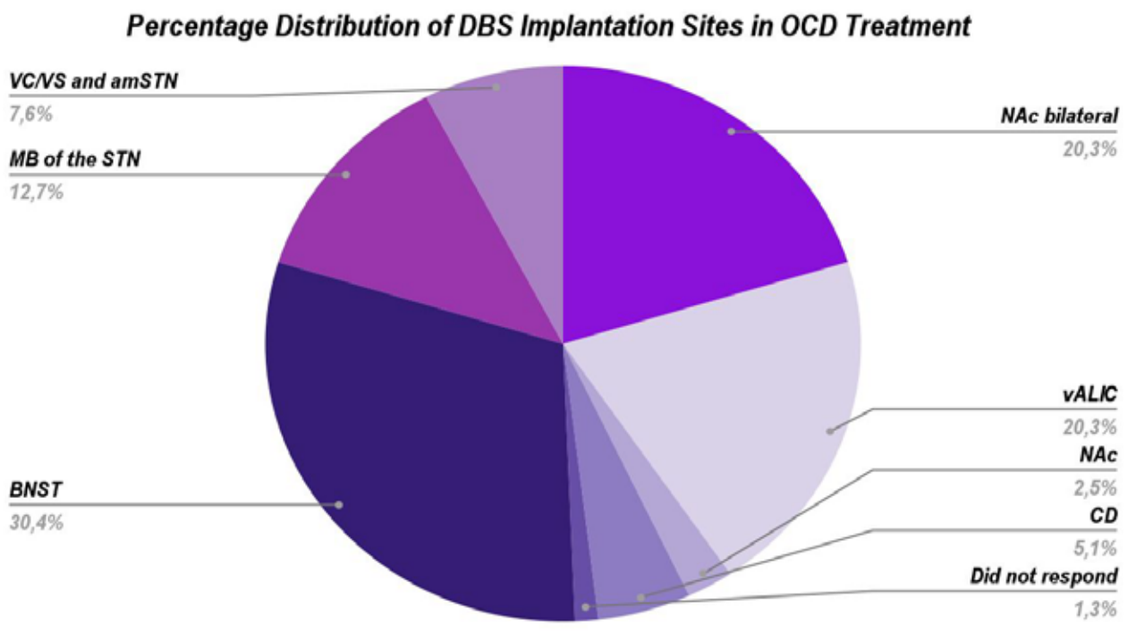
METHODS

Search strategy followed the PRISMA guidelines and was performed with the following equation: "(((DBS[Title/Abstract]) OR (deep brain stimulation[Title/Abstract])) AND (OCD[Title/Abstract])) AND (obsessive compulsive disorder[Title/Abstract])" on PubMed and the Cochrane library. Articles published in the last 10 years were considered. Duplicate entries and studies that did not specify how many patients underwent the procedure were removed, leaving a total of 9 studies with 108 patients.

RESULTS

Individuals with OCD and DBS-on had more positive evaluations compared to DBS-off. In a study on personalized striatal targets for DBS, 86% of patients were considered responders to treatment, with median symptomatic reduction of 50%. The optimal target for stimulation was found in the caudate nucleus in 67% of cases and in the nucleus accumbens in 33%.

Bilateral stimulation of the nucleus accumbens resulted in an average improvement of 90% in the overall score, 39.5% in the physical and psychological domains, and 16% in the environmental domain of the WHOQOL-BREF. Studies also reported significant improvement on various assessment scales such as Y-BOCS and others, between the period before electrode implantation and up to 8 months after implantation. Stimulation of the anteromedial subthalamic nucleus was responsible for a significant improvement in cognitive flexibility, while ventral capsule/ventral striatal DBS had a greater effect on mood. No additional improvement followed cognitive-behavioral therapy.



CONCLUSION

Results highlight the effectiveness of DBS for OCD treatment, with a high response rate and significant symptomatic reduction. The accurate selection of the stimulation site nucleus is crucial for a personalized and qualified approach. However, long-term studies are still essential to understand the optimal guidance of DBS as a therapeutic option.

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TRABALHOS APROVADOS

Sub-eixo temático:

Inovação



16º CBENF
Congresso Brasileiro de Estereotaxia e Neurocirurgia Funcional
1º a 4 de maio de 2024 Florianópolis-SC

Código.: 4DMQ

VIRTUAL INSIGHT: THE IMPACT OF AUGMENTED REALITY ON NEUROANATOMY PEDAGOGY

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16th CBENF Brazilian Congress of Stereotaxic and Functional Neurosurgery
May 1st to 4th, 2024 Florianópolis-SC

Introduction: The advent of new digital information and communication technologies is revolutionizing classroom dynamics daily. This transformation necessitates a reevaluation of teaching and learning processes, with a focus on the integration of active methodologies. In the health education sector, technology facilitates the creation of innovative learning tools that can ignite curiosity and foster knowledge acquisition. ***Objective***: This study aims to assess the impact of a novel virtual reality platform on the teaching of clinical neuroanatomy to students in health-related fields. The platform is designed to simulate real-life scenarios, closely mirroring the experiences of healthcare professionals working with neurosurgical patients. These tools are particularly valuable for complex subjects like neuroanatomy and its clinical relevance, as they enhance communication and engage health science students more effectively. ***Method:*** The hardware employed for this study supports rapid setup (under one minute), enhancing usability without the need for additional computing resources. The platform offers an immersive experience with 3D models of anatomical structures and real-life neurosurgical case studies, including pathology and radiological examinations. Students can interact with and manipulate these virtual models freely. This approach was evaluated using a group of 341 students from health-related courses across three universities. Assessments were conducted immediately following instruction, and again after three and six months, comparing outcomes with and without the use of virtual reality in a neuroanatomy course. Self-assessment questionnaires were also utilized to measure students' confidence in applying their knowledge in practical settings. ***Results*****:** Statistical analysis revealed significant improvements ($P<0.04$) in student performance across all three assessment periods, particularly in terms of knowledge retention, as indicated by the self-assessment results ($p<0.01$). ***Conclusion***: The mixed reality system introduced in this study has proven to be an effective and affordable educational tool. The immersive virtual environment significantly enhances both short- and long-term retention of knowledge, thereby increasing the efficiency of study time. Importantly, this approach places students at the center of their learning journey, empowering them to take an active role in their education.



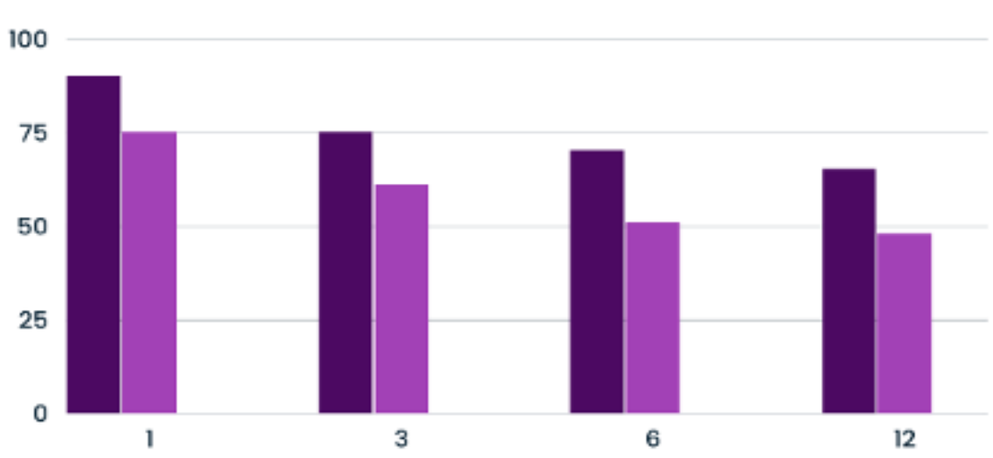


Fig. Assessment at months 1, 3, 6, 12. ($P<0.01$)

APOIO

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Código.: 4DN6

Development of a 3D Printed Stereotactic Arc

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16th CBENF Brazilian Congress of Stereotaxic and Functional Neurosurgery
May 1st to 4th, 2024 Florianópolis-SC

INTRODUCTION

In the realm of modern neurosurgery, stereotactic surgery stands as a pivotal technique, facilitating the precise localization and access to intracranial targets. This method is essential for a plethora of neurosurgical interventions, offering a pathway to treatments that demand meticulous accuracy. Despite its critical role, the high cost and scarcity of stereotactic surgery apparatuses, particularly in Brazilian hospitals, pose significant barriers to its widespread adoption. Addressing this gap, a groundbreaking initiative aimed at designing, manufacturing, and evaluating a 3D printed Stereotactic Arc has emerged, offering a beacon of hope for enhancing the accessibility and efficiency of stereotactic surgeries.

OBJECTIVE

This study focuses on designing, manufacturing, and evaluating a 3D printed Stereotactic Arc, intended for daily neurosurgical use. Aimed at practical clinical application, the project seeks to provide a cost-effective, efficient alternative to traditional equipment, enhancing surgical precision and outcomes in neurosurgery

METHOD

Using 3D CAD/CAM modeling software, we developed a virtual model of the Stereotactic Arc based on the principle of the Leksell Arc, as well as the N-navigation system proposed by Brown-Roberts. Within this context, we produced the Stereotactic Arc through additive manufacturing on a 3D printer. Nylon material was used, optimizing the printing parameters to ensure greater strength and stability.

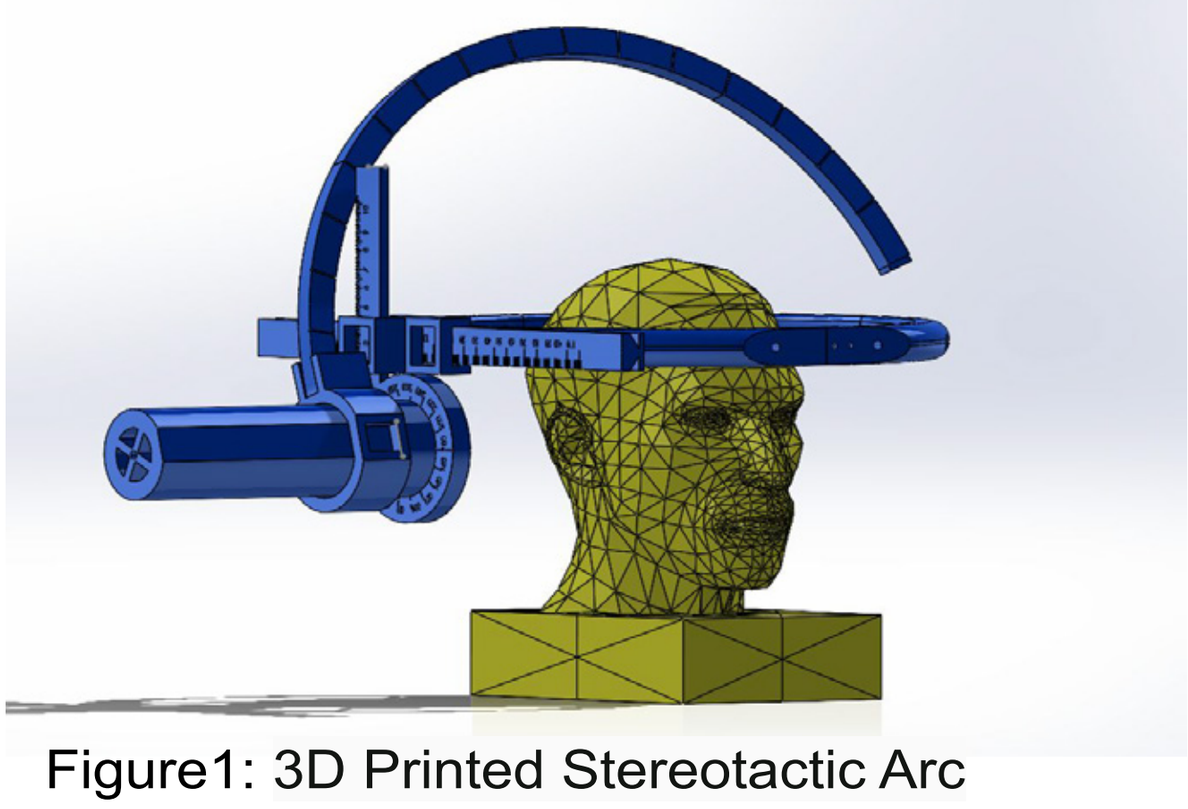


Figure1: 3D Printed Stereotactic Arc

RESULTS

The results indicated that the 3D printed stereotactic arc can be effectively utilized for surgical procedures, offering stability and safety during use. The ease of handling and operation stands out as a notable feature of this model, providing an intuitive user experience for neurosurgeons. Additionally, the precision achieved by the 3D printed arc is approximately 1.5 mm, indicating a high level of accuracy suitable for the precise requirements of stereotactic surgery..

CONCLUSION

This arc model is innovative as it is the first developed to be produced with additive manufacturing. This innovation could represent a significant decrease in the acquisition cost of this instrument, thus it can be used to increase access to stereotactic surgery. In the future, the proposed model will be validated, and a comparative study will be conducted with models available on the market

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Código.: 4DNK

Transcranial Magnetic Stimulation for post-stroke visual field defect.

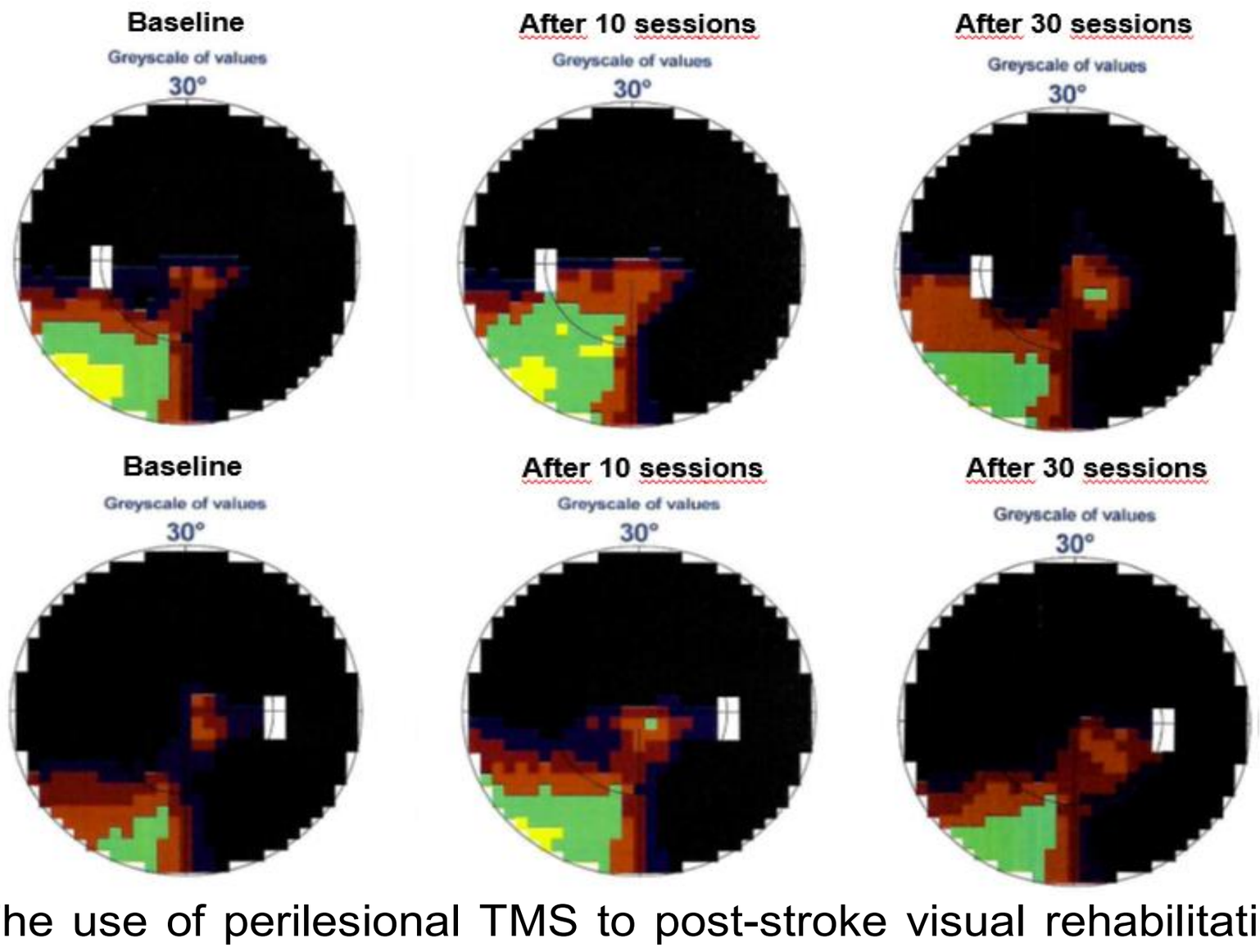
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Case: A 47-year-old patient, with a medical history of right vertebral artery dissection and ischemic stroke. He had total acute visual deficit, balance changes and left hemiparesis as consequences of the stroke. Magnetic Nuclear Resonance Imaging (MRI) of the brain demonstrated encephalomalacia affecting the posterior cerebral arteries' territory, mainly on the right. After physical rehabilitation, he had significant improvement in balance, gait and strength. Spontaneously, there was partial improvement in his vision field. Eight months after ischemic brain injury, 10 consecutive sessions of high-frequency repetitive Transcranial Magnetic Stimulation (rTMS) were performed in the perilesional cortex of the bilateral occipital lobe. Craniometric points identified through MRI were used to position the coil. Stimulation parameters were 10Hz, 90% of resting motor threshold, 25 trains, 40 pulses per train and 20 seconds interval. The patient observed partial improvement in the visual field, as identified by comparing Computerized Visual Perimetry performed before and after the intervention with rTMS. The goal of this case report is to present the use of TMS as a possible tool to post-stroke visual rehabilitation.

Discussion: The prevalence of visual field changes after brain injury varies from 8 to 16% in chronic post-stroke stages. Recovery after 3-6 months due to reduction in cerebral edema can occur, but only 5% of patients experience total recovery. The use of TMS to post-stroke motor rehabilitation is already known in literature, however the use of this tool for visual rehabilitation is still an uncommon scenario. In apparently healthy perilesional areas, TMS was used to restore the visual field. Intact areas in the visual cortex and functionally related to the infarcted tissue also may assume part of the lost function.

Left:



Right:



Conclusions: The use of perilesional TMS to post-stroke visual rehabilitation may be an option for reestablishing this sequelae. Larger studies are necessary for the routine clinical use of this technique.

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Código.: 4DNY

DEVELOPMENT OF LOW-COST 3D PRINTED MODELS FOR STEREOTACTIC SURGERY PLANNING AND TRAINING: from stereotactic biopsies to stereoelectroencephalography electrode insertion

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Introduction

The recent development and spread of 3D-printers, including desktop versions of the equipment allowed for its application for neurosurgical planning and training. In the literature, there are examples of this paradigm for various neurosurgical pathologies, such as complex tumors. In line with these applications, it is possible to assess the feasibility of this scenario for functional neurosurgery planning and training.

Objectives

- To establish the framework for patient-based low-cost 3D-printed models
- Test the feasibility of functional neurosurgery planning and training for stereotactic biopsies and SEEG electrode insertion with the models developed

Methods

- Informed consent was obtained from the patients that were previously operated at the institution, in order to use the archived head computerized tomography (CT) and brain magnetic resonance image (MRI) scans to develop low-cost 3D-printed models of the patient's skulls
- The CT and MRI scans were anonymized and saved as DICOM files
- The CT DICOM files were then processed in the same opensource software, to generate a .stl file, in which turn it was opened in another opensource software for the rendering of the purposed model to be printed in a desktop 3D-printer
- The models were printed with a PLA filament in real size and to simulate the consistency of the brain, gelatin filling was applied to the inside of the model
- A simulation of the planning and surgical procedures was carried out with the models with a frame-based paradigm similar to the one adopted at the institution.

Summarized steps

Phase I - Model generation

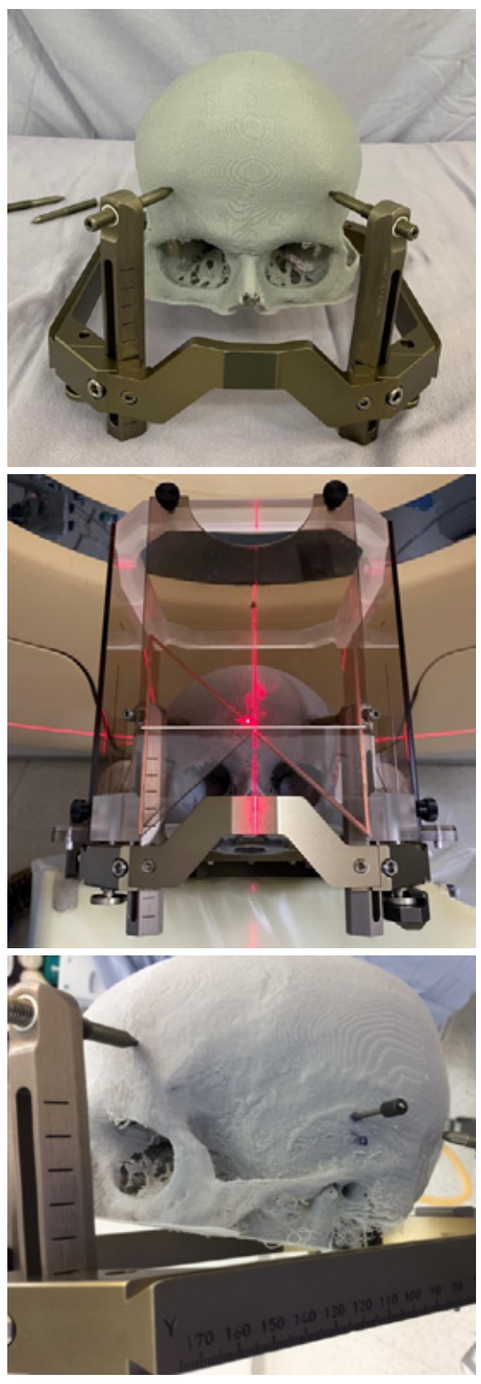
Patient's volumetric CT (DICOM)
Image processing and creation of .stl file
Model rendering and 3D-printing
Gelatin filling to simulate brain tissue

Phase II - Surgical simulation and training

Stereotactic frame positioning
CT of the generated model with the frame
Fusing the model CT and patient's MRI
Stereotactic planning and surgical simulation
Post-simulation CT for quality control

Results

- Three patient-specific real-size models were generated – two of patients with a diagnosis of pharmacoresistant epilepsy that underwent SEEG surgery and one patient with suspect of high-grade glioma that underwent stereotactic biopsy
- The CT scans of the models, coupled with each preoperative MRI were then successfully fused and recognized as the patient's own skull by the planning system used at the institution
- The SEEG electrodes were then successfully inserted at the models, as well as the stereotactic cannula for the biopsy simulation, granting a real-life simulation of the planning steps and surgeries purposed



Created 3D-model with the positioning of the stereotactic frame

Scanning the model followed by fusion of the patient's MRI and the CT images of the model

First SEEG electrode fully inserted after bolt positioning

Conclusions

It is feasible to develop low-cost 3D-printed individualized models of patient's head and to apply the current institutional preoperative and intraoperative steps to plan and simulate functional neurosurgeries such as SEEG electrodes implantation and stereotactic biopsies.

References and further resources:

Access the QR code

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