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Neurosurgery

1. Review

Endoscopic endonasal surgery for anterior skull base meningiomas

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Cite this article: Avery MB, Barkhoudarian G, Kelly DF. Endoscopic endonasal surgery for anterior skull base meningiomas. *Mini-invasive Surg* 2021;5:17. <http://dx.doi.org/10.20517/2574-1225.2021.05>

Abstract

Meningiomas of the tuberculum sellae, planum sphenoidale and olfactory groove region are relatively common. Traditionally these meningiomas have been approached through several transcranial approaches. More recently, keyhole approaches have been utilized with success even for large tumors. Endoscopic approaches are an extension of this philosophy, which, in carefully selected patients, may be an excellent alternative, offering a direct line of site from an endonasal approach without brain retraction. Furthermore, bilateral optic canal decompression can be safely and effectively accomplished. We propose that a majority of tuberculum sellae and posterior planum meningiomas may be removed via an endonasal approach, particularly those that are 3 cm or smaller in maximal diameter with minimal lateral extension beyond the supraclinoid carotid arteries and with medial optic canal invasion. A deepened sella is also a favorable factor for endonasal removal. In contrast, we propose that a minority of olfactory groove meningiomas are ideal candidates for endoscopic trans-cribriform removal given the higher risk of anosmia and cerebrospinal fluid leak via the nasal corridor. Instead, a majority of these tumors can be safely and effectively removed via a transcranial keyhole approach, such as the supraorbital “eyebrow” craniotomy or traditional pterional craniotomy with a higher rate of olfaction preservation.

2. Review

Neuroimaging in meningiomas: old tips and new tricks

[HTML](#) [PDF](#)

Cite this article: Elefante A, Russo C, Di Stasi M, Vola E, Ugga L, Tortora F, De Divitiis O. Neuroimaging in meningiomas: old tips and new tricks. *Mini-invasive Surg* 2021;5:7. <http://dx.doi.org/10.20517/2574-1225.2020.102>

Abstract

Meningiomas are the most common neoplasm of the central nervous system. Usually benign and generally discovered incidentally at imaging, meningiomas can also be responsible for severe neurological symptoms and deficits, with potentially high morbidity and non-negligible mortality. Therefore, neuroimaging plays a crucial role in meningiomas diagnosis, therapeutic planning, and long-term surveillance, for early detection of both recurrence in treated patients and disease progression in untreated ones. Here, we review conventional findings in meningiomas' imaging, review the role for advanced diagnostic techniques, and offer an overview on possible future neuroimaging applications.

3. Review

The endoscope and instruments for minimally invasive neurosurgery

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Cite this article: Shaikh S, Deopujari C. The endoscope and instruments for minimally invasive neurosurgery. *Mini-invasive Surg* 2020;4:89.

<http://dx.doi.org/10.20517/2574-1225.2020.97>

Abstract

The advent of neuroendoscopy catalyzed the ongoing development of minimally invasive neurosurgery in the 1990s. This millennium has seen rapid developments in

the design of scopes, improved high-definition visualization systems, and a plethora of dedicated instruments. Many minimally invasive and endoscopic procedures have become the new “standard of care” today. Endoscopic third ventriculostomy and endonasal pituitary surgeries have replaced alternative techniques in most major institutes in the world and the indications are rapidly increasing to tackle many midline skullbase, intraventricular, and some parenchymal lesions as well. The scope of minimally invasive neurosurgery has extended to spine surgery, peripheral nerve surgery, and unique indications, viz. craniostomosis repair. This review describes many of these developments over the years, evaluates current scenario, and tries to give a glimpse of the “not so distant” future.

4. Review

Endoscope-assisted transcranial surgery for anterior skull base meningiomas

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Cite this article: Azab WA, Elmaghraby MA, Zaidan SN, Mostafa KH.

Endoscope-assisted transcranial surgery for anterior skull base meningiomas.

Mini-invasive Surg 2020;4:88. <http://dx.doi.org/10.20517/2574-1225.2020.75>

Abstract

Anterior skull base meningiomas are benign, dural-based tumors that originate from the tuberculum sellae, planum sphenoidale or olfactory groove. A multitude of traditional transcranial approaches have been effectively used for resection of these tumors. However, in the era of minimally invasive neurosurgery, the endoscopic endonasal and the endoscope-assisted or endoscope-controlled supraorbital keyhole eyebrow approaches stand out as the two main options utilized to resect these tumors. The supraorbital keyhole approach minimizes brain retraction, tissue dissection and length of the skin incision. Consequently, this approach is associated with a lower complication profile and much better cosmetic results in comparison to classic

approaches. With endoscopic assistance or control, the approach provides an excellent view of anterior skull base meningiomas and enables optic nerve decompression when angled scopes are used. In our opinion, endoscopes will ultimately replace the surgical microscopes as the viewing tools in this type of surgery. A limited number of studies have directly compared the endoscopic endonasal approach versus the supraorbital keyhole one for resection of anterior cranial base meningiomas. In these studies, scores and algorithms have been suggested to help select the suitable approach. The practical value of these algorithms still needs to be validated by further research. Although the endoscope-assisted or -controlled supraorbital keyhole approach offers a minimally invasive and highly effective approach for excision of anterior cranial base meningiomas, the ideal approach should be tailored to the individual patient according to the tumor size, lateral extension, optic canal involvement, extent of vascular encasement and surgeon's experience.

5. Review

Meningiomas: criteria for modern surgical indications

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Cite this article: Cappabianca P, d'Avella E, Cavallo LM, Solari D. Meningiomas: criteria for modern surgical indications. *Mini-invasive Surg* 2020;4:83.

<http://dx.doi.org/10.20517/2574-1225.2020.67>

Abstract

The contemporary management of meningiomas is the result of the continuous evolution of neurosurgical techniques, along with the refinement of dedicated instrumentations. Above all, it is the magnification of the surgical view, thanks to the microscope and the endoscope, and their advancements, which allowed the improvement of surgical outcomes, in terms of both extent of resection and morbidity rates. Because of the benign nature of the vast majority of meningiomas, complete tumor resection is curative, and it is the gold-standard treatment. However, in the case

of high risk of surgical morbidity, a less aggressive surgical treatment may be justified, also upon tailored analysis of the meningiomas' biological behavior and the improvements in postoperative strategies. The endoscopic technique plays a role, as a unique visualization tool or in combination with the microscope, in granting so-called maximum allowed resection. Considering the above, the most challenging task confronting modern meningioma surgery remains the selection of the most appropriate surgical approach, the latter greatly depending on location, anatomic tumor features, and relationships with critical neurovascular structures. Herein, we present a cogent analysis of the modern multifaceted indications for the endoscopic treatment of meningiomas, with a glimpse into the adjacent fields.

6. Review

The role of Vitom-3D in the management of spinal meningiomas: review of the literature and illustrative case

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Cite this article: de Divitiis O, d'Avella E, Sacco M, Somma T, Turgut M, Baro V, Denaro L. The role of Vitom-3D in the management of spinal meningiomas: review of the literature and illustrative case. *Mini-invasive Surg* 2020;4:75.

<http://dx.doi.org/10.20517/2574-1225.2020.66>

Abstract

The favorable outcome generally associated with spinal meningioma surgery is the result of the continuing refinement of the surgical technique, the use of intraoperative neuromonitoring, and a better understanding of the tumor biological behavior. Among all the technological advancements, visualization tools are the keys to any successful surgical procedure. The operating microscope is the gold standard in all neurosurgical procedures. In recent years, high-definition exoscope systems have entered the field of neurosurgery, as another tool in the armamentarium of the contemporary neurosurgeon. After initial experiences and technical improvements, the exoscope has

proven to be best suited for spinal procedures. This study aims to briefly review the exoscope journey in neurosurgery, with a special focus on spinal meningioma surgery. Benefits and limitations are analyzed and an illustrative case is reported. Spinal meningiomas removal under exoscope visualization has proven to be feasible, efficient, and safe. Indication for the use of the exoscope greatly depends on meningioma size, consistency, relationship to surrounding neurovascular structures, and the surgeon's experience. Switching to the operating microscope, if deemed safer, should always be considered.

7. Review

The role of endoscopy and radiosurgery in the management of cavernous sinus meningiomas

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Cite this article: Cossu G, Abarca J, Levivier M, Starnoni D, Daniel RT, Berhouma M, Messerer M. The role of endoscopy and radiosurgery in the management of cavernous sinus meningiomas. *Mini-invasive Surg* 2020;4:60.

<http://dx.doi.org/10.20517/2574-1225.2020.52>

Abstract

Cavernous sinus (CS) meningiomas represent a formidable neurosurgical pathology. The desired treatment depends on tumor size and extensions apart from the presenting clinical symptoms of the patient. The last few decades have shown a paradigm shift in the management towards a multimodal treatment. For patients with tumors presenting with a medial extension or when the meningioma occupies the antero-inferior portion of the CS, an endoscopic biopsy can be safely performed through the endonasal route. The boundaries of endoscopic endonasal approaches have been pushed during the last decade, and a direct access to the CS may now be performed. At the same time, an extensive bony decompression to decompress the optic canal and the pituitary gland

may be performed. Autologous fat may be interposed between the residual tumor and radiosensitive structures to safely perform adjuvant radiation therapy. The aim of this manuscript is to describe the role of endoscopic surgery in the management of cavernous sinus meningiomas along with the complementary role of radiotherapy. We describe the endoscopic anatomy and the surgical technique to safely perform the procedure and we review the surgical series reported in the literature dealing with the endoscopic approach for CS meningiomas with or without complementary radiation therapy. Endoscopic endonasal approaches have shown promising results in terms of improvement or stabilization of cranial neuropathy and hypopituitarism. Furthermore, the endoscopic approach may enhance the efficacy and safety of stereotactic radiosurgery through the performance of an hypophysopexy and/or chiasmopexy.

8. Original Article

The difference of intraoperative free-run electromyography monitoring between percutaneous endoscopic lumbar discectomy via a transforaminal and via an interlaminar

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Cite this article: Nakamura JI, Setoue T, Hara J. The difference of intraoperative free-run electromyography monitoring between percutaneous endoscopic lumbar discectomy via a transforaminal and via an interlaminar. *Mini-invasive Surg* 2019;3:29. <http://dx.doi.org/10.20517/2574-1225.2019.28>

Abstract

Aim: Transforaminal percutaneous endoscopic lumbar discectomy (TF-PELD) is usually performed under local anesthesia because the patient should be conscious to prevent nerve root injury. However, some patients cannot tolerate intraoperative pain and require intravenous analgesia, or must be converted to surgery under general anesthesia (GA). If PELD under GA can be performed safely, it is more convenient and comfortable for both the patient and surgeon.

Methods: A total of 49 cases (mean age, 53 years) were examined. PELD was performed under GA with free-run electromyography (f-EMG) monitoring. Clinical outcomes were assessed according to the visual analogue scale score (VAS) and the Oswestry disability index (ODI). All patients were monitored with f-EMG.

Results: VAS decreased from 7.7 to 1.1 and ODI from 62.3% to 20.5%. A true-positive was observed in one of 27 TF-PELD cases. Care during the procedure is necessary to avoid the risk of severe neurological injury. A false-negative was observed in one of 22 interlaminar (IL)-PELD cases. This patient complained of aggravated numbness for 6 months after surgery. False-positives were recorded in 2 cases of IL-PELD with a train wave just after removal of the herniated discs.

Conclusion: F-EMG monitoring during PELD under GA was useful to identify nerve root damage. TF-PELD under GA requires f-EMG to ensure safety. On the contrary, IL-PELD does not necessitate f-EMG.

9. Case Report

Intradural lumbar disc herniation after full-endoscopic lumbar discectomy using the interlaminar approach: case report

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Cite this article: Hori T, Ohmori K, Ono K. Intradural lumbar disc herniation after full-endoscopic lumbar discectomy using the interlaminar approach: case report. *Mini-invasive Surg* 2019;3:21. <http://dx.doi.org/10.20517/2574-1225.2019.15>

Abstract

A 67-year-old man complained of the sudden onset of disabling pain in his right leg. He had already undergone full-endoscopic lumbar discectomy, interlaminar (FELD-IL) approach twice for lumbar disc herniation (LDH) at the L4/5 level. MRI showed recurrence of LDH at L4/5 level. Intradural masses were also suspected at the L4 vertebral level. Discography at the L4/5 disc showed contrast medium leakage from

the disc to the subarachnoid space. Operation was performed and fragments of the herniated disc were carefully removed under a surgical microscope. The ventral dura mater could be seen adhering to the L4/5 disc. This report is the first documentation of intradural LDH after FELD-IL. Although FELD is less invasive than previous procedures, adhesion between dura mater and surrounding tissues may occur. It is most important to apply discography to confirm the presence of a hole between the intradural space and the disc.