

MINIMALLY INVASIVE SURGERY USING MINI-PTERIONAL INTERFASCIAL APPROACH FOR THE CLIPPING OF A RUPTURED ANEURYSM OF THE RIGHT CAROTID BIFURCATION AT THE DOS DE MAYO NATIONAL HOSPITAL, LIMA PERU

Cirugía de invasión mínima mediante abordaje interfascial minipterional para el clipaje de aneurisma roto de la bifurcación carotídea derecha en el Hospital Nacional Dos de Mayo, Lima-Perú

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ABSTRACT

Introduction: Carotid bifurcation aneurysms represent 2 to 9% of intracranial aneurysms¹. They can be treated by endovascular or microsurgical techniques³, the latter being the most complex¹⁻⁴ and used with low frequency in this type of aneurysm⁷.

Clinical case: A 57-year-old woman with a ruptured aneurysm of the right carotid bifurcation, incidentally, another small unruptured aneurysm of the left posterior communicating was found. She underwent a mini-pterional interfascial approach and aneurysm clipping with satisfactory results and a favorable evolution.

Conclusion: Aneurysms of the carotid bifurcation are not frequent; this is a non-common case due to the age of 57 years. The technique performed allowed the identification of the aneurysm, as in the classical pterional approach, but trying to minimize morbidity. The patient did not present post-surgical complications despite the risk factors presented, such as unbroken contralateral aneurysm, edema due to subarachnoid hemorrhage and arterial hypertension.

Keywords: Aneurysm, Ruptured, Subarachnoid Hemorrhage, Hypertension. (Source: MeSH NLM)

RESUMEN

Introducción: Los aneurismas de bifurcación carotídea representan del 2 al 9% de los aneurismas intracraneales¹. Pueden ser tratados mediante técnicas endovasculares o microquirúrgicas³, siendo esta última la más compleja¹⁻⁴ y usada con baja frecuencia en este tipo de aneurismas⁷.

Caso clínico: Mujer de 57 años con un aneurisma de bifurcación carotídea derecha roto, incidentalmente se encontró otro aneurisma pequeño no roto de comunicante posterior izquierdo. Fue sometida a un abordaje interfascial minipterional y clipaje del aneurisma con resultados satisfactorios y una evolución favorable.

Conclusión: Los aneurismas de la bifurcación carotídea no son frecuentes, este es un caso particular debido a la edad de 57 años. La técnica realizada permitió la identificación del aneurisma, tal como en el abordaje pterional clásico, pero tratando de minimizar la morbilidad. La paciente no presentó complicaciones post quirúrgicas pese a los factores de riesgo presentados, como el aneurisma contralateral no roto, edema por hemorragia subaracnoidea e hipertensión arterial.

Palabras clave: Aneurisma Roto, Hemorragia Subaracnoidea, Hipertensión. (Fuente: DeCS Bireme)

Peru J Neurosurg 2020, 2(1): 27-31

Aneurysms of the Internal Carotid Artery bifurcation (ICAbifAs) correspond to dilatations of the wall of the internal carotid artery, located in the bifurcation between segment A1 of the anterior brain and M1 of the middle brain ¹. They represent 2 to 9% of all intracranial aneurysms¹ and are more frequent in young people ².

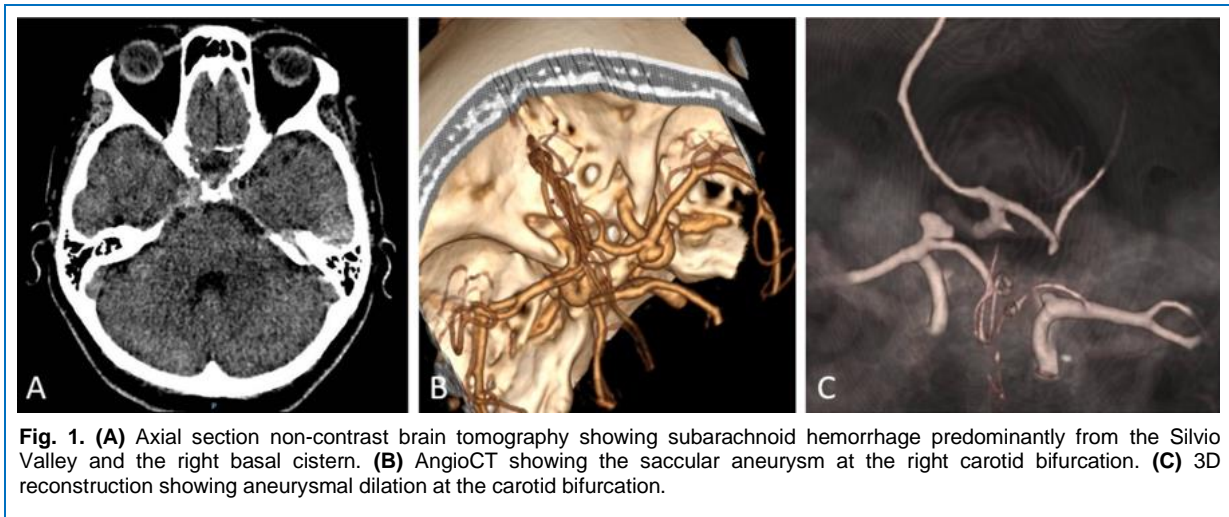
The treatment of these aneurysms can be endovascular or microsurgical ³, the latter being considered a complex treatment because the aneurysms are located at the apex of Silvio's fissure, below the frontal lobe, which is surrounded and adhered to perforating arteries ^{1,2,4}, classified as a high risk area.

Submitted : December 04, 2019

Accepted : December 22, 2019

HOW TO CITE THIS ARTICLE: Acha JL, Yaya-Loo H, Yabar D, Quispe-dextre J, Herrera-Orellana D, Pasache-Juarez J.

Minimally invasive surgery using mini-pterional interfascial approach for the clipping of a ruptured aneurysm of the right carotid bifurcation at Dos de Mayo National Hospital, Lima-Peru. *Peru J Neurosurg* 2020; 2(1): 27-31



The microsurgical approach to aneurysms has undergone changes over time, classically large craniotomies were used, the classic pterional approach, allows an adequate visualization of the vascular anatomy; however, it has been associated with complications such as postsurgical headache, pain when chewing, temporomandibular dysfunction, palpebral ptosis due to involvement of the frontal branch of the facial nerve and aesthetic implications for hypertrophy of the temporal muscle and large scars ⁵.

Due to this and thanks to the advancement in microsurgical techniques, minimally invasive approaches have been developed, such as the minipterional and supraorbital craniotomy⁶, which minimize or avoid possible complications of the pterional craniotomy, although at the same time they require great experience from the neurosurgeon.

The minipterional interfascial approach has been used in the clipping of aneurysms of the anterior circulation, the middle cerebral artery, the posterior communicating, the anterior communicating, the choroid segment and the ophthalmic ⁷; however, the use of this approach in bifurcation aneurysms has not been extensively described ^{8,9}.

The purpose of this work is to present a case that evidences personal experience in the minipterional interfascial approach in the clipping of a carotid bifurcation aneurysm.

CLINICAL CASE

History and Exam: 57-year-old female patient from Pucallpa with a history of chronic hypertension. She presented an intense headache accompanied by nausea and vomiting, so she went to a Health Center in her town where she was evaluated and referred to the Pucallpa Regional Hospital (Ucayali, Peru). Brain tomography showed Fisher II subarachnoid hemorrhage (SAH), grade I according to the Hunt and Hess scale and grade I according to the World Federation of Neurosurgery (WFNS) scale.

Patient was transferred to Dos de Mayo National Hospital where a cerebral angio-tomography was performed, which showed a ruptured saccular aneurysm of the right carotid bifurcation and, incidentally, another small unbroken aneurysm of the left posterior communicating artery.

On examination the patient was awake, Glasgow scale: 15, isochoric and reactive pupils, mild right palpebral ptosis and left hemiparesis (ULs 3/5 and LLs 4/5), without alterations in other systems. Angiography confirmed the diagnosis of a right carotid bifurcation aneurysm measuring 3.86 x 3.92mm (neck x length) and another incidental unruptured aneurysm in the left posterior communicating segment (Fig. 1).

Treatment: A Minipterional craniotomy was performed with an interfascial approach (Fig. 2) achieving clipping of the ruptured aneurysm of the right Carotid Bifurcation, without presenting intraoperative complications (Fig. 3).

Clinical evolution: After surgery, the patient was transferred to the Neurointensive Therapy Unit. Post-surgical tomography showed adequate clipping of the aneurysm with total closure of the aneurysm neck (Fig. 4). The patient presented a good clinical evolution, went to hospitalization and was later discharged, being in Glasgow: 15, isochoric and reactive pupils with evident improvement in hemiparesis with the support of physical therapy.

DISCUSSION

Internal Carotid Artery bifurcation aneurysms (ICAbifAs) occur in 5 out of 100 intracranial aneurysms ^{4,10}. Its majority presentation is in young people ², (which contrasts with our reported patient who was 57 years old) and they are frequently associated with one or more non-ruptured intracranial aneurysms, as reported by Lehecka et al. ¹ who in a group of 137 patients with ICAbifAs found 59 patients with an additional aneurysm, with the middle cerebral artery being the most frequent location.

In our reported case, a small unruptured aneurysm was found in the left posterior communicating segment; due to its size and location it was decided to only observe and follow up with images periodically.

The surgical strategy in carotid bifurcation aneurysms is challenging because of its location at the highest point of the carotid artery, which is covered by the frontal lobe and surrounded by perforating arteries ¹. The surgical exposure

should allow adequate access and visualization, minimizing parenchymal retraction ¹.

The classic pterional craniotomy meets these requirements¹¹, however it also has potential post-surgical complications such as local pain, temporomandibular dysfunction, temporal muscle atrophy, ptosis due to involvement of the frontal branch of the facial, and aesthetic impact due to the size of the scar ⁵. As an alternative to these complications, minipterional and supraorbital craniotomies were developed ⁷.

Lehecka et al.¹ proposed the lateral supraorbital approach ¹², for the ICAbifAs approach. Sabersky et al.⁹ used the minipterional approach in 7 patients, concluding that it provides less invasion due to a craniotomy less than 4 cm., Preservation of the function of the storm and better aesthetic results.

Yagmurlu et al.⁸, reports the minipterional approach in 27 patients over a period of 8 years and points out that the objective is not to achieve a small craniotomy, but to minimize damage to the surrounding tissue by providing the same exposure offered by the traditional approach and that the correct location of the craniotomy is more important than the size.

In our case, the minipterional approach was used with which it was possible to minimize the surrounding damage, allowing a quick recovery and a good aesthetic result.

The result is favorable, and the degree of disability generated by the SAH was measured according to the modified Rankin scale (mRS) ¹³. A mRS of 2 at hospital discharge was achieved, with a degree of mild disability, which does not affect basic life activities. daily. The patient was clinically evaluated at one month and at three months, showing neurological recovery with mRS of 1. Adequate clipping of the aneurysm was also verified in the control angiography (Fig. 4).

CONCLUSION

The minipterional approach is reliable, less invasive, with less time and surgical exposure, reduces morbidity due to less manipulation of the structures adjacent to the aneurysm, but requires extreme skill and training to carry it out without difficulty.

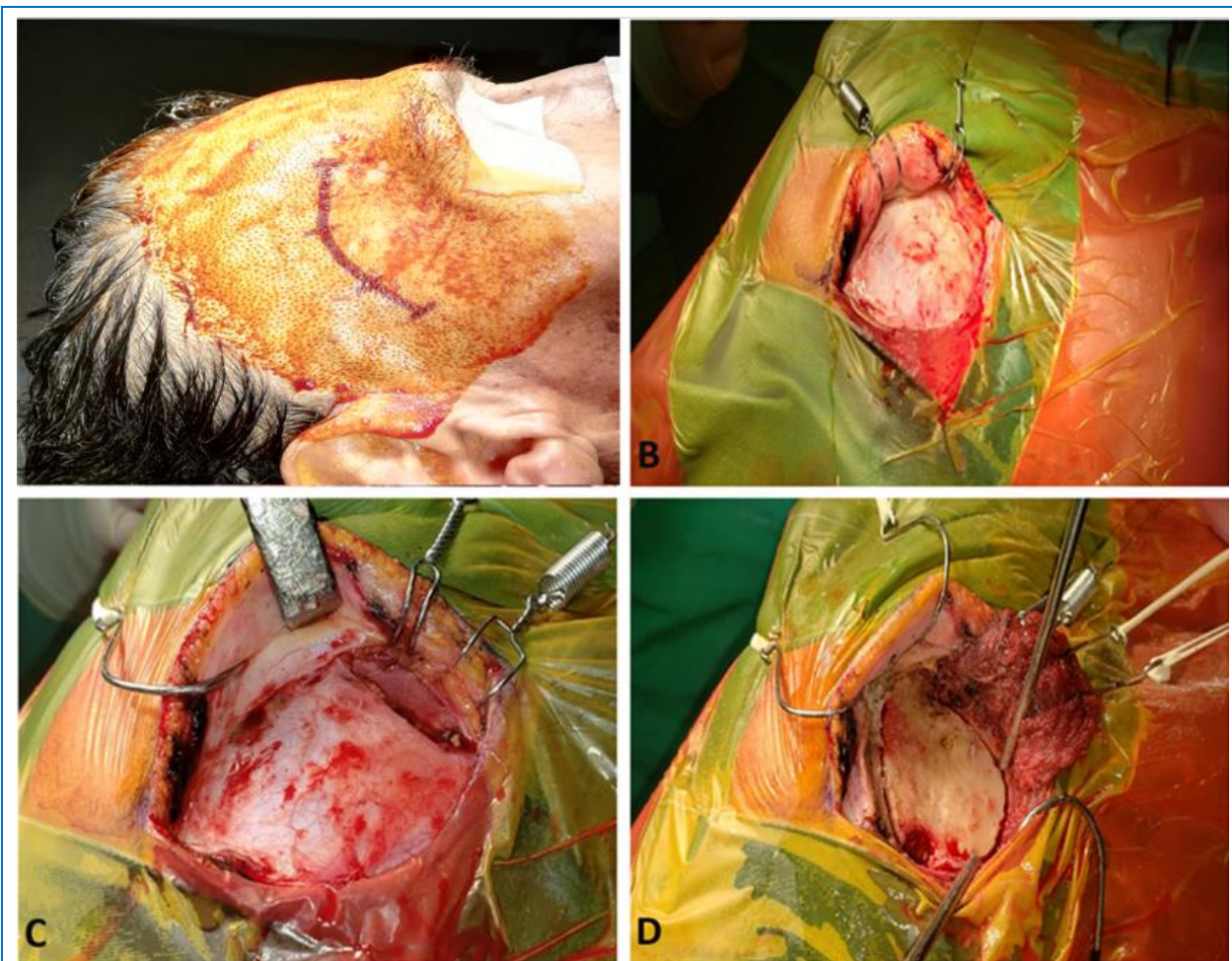


Fig. 2. (A) Curvilinear incision 1 cm above the zygomatic arch and 1 cm from the external auditory canal, up to the superior temporal line and behind the hair implantation edge. (B) Retraction of the cutaneous flap and exposure of the temporal muscle. (C) Exposure of the temporal and interfascial muscle to protect the frontal branches of the facial nerve. (D) The temporal muscle incision ends 3 cm above the tragus to avoid postoperative chewing symptoms. Muscle flap is dissected subperiosteally.

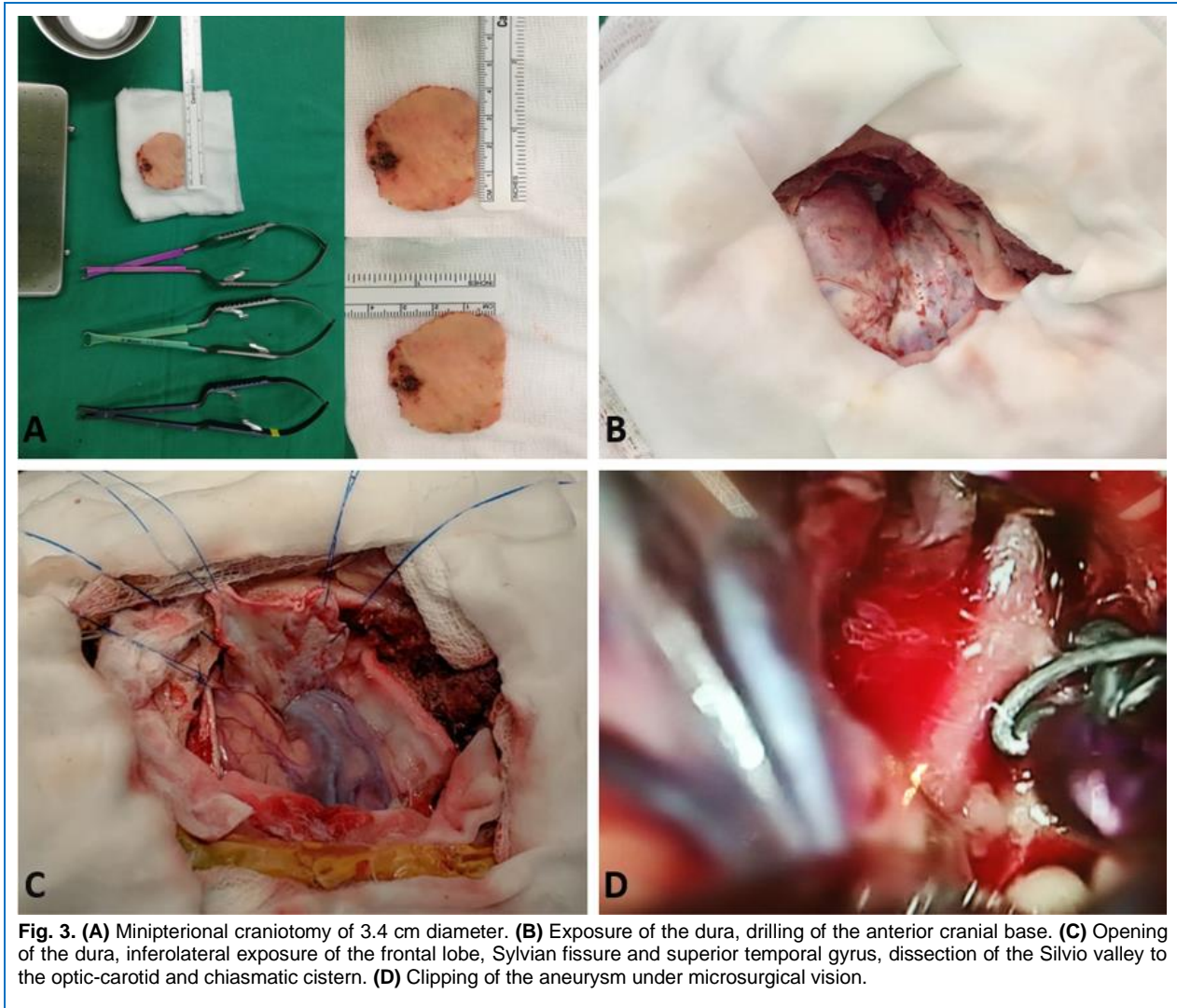


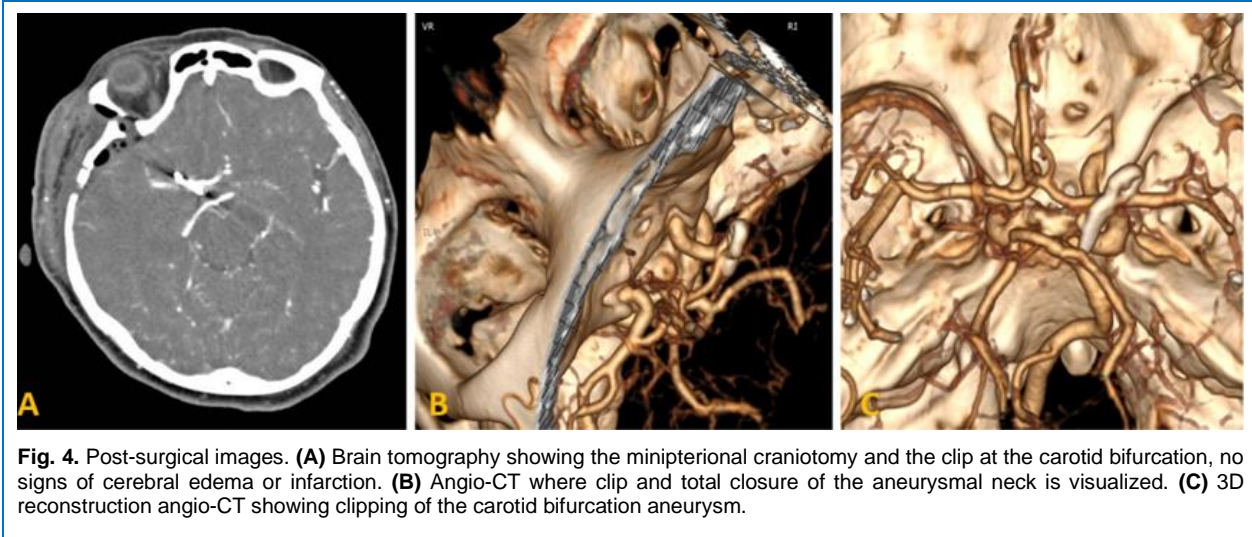
Fig. 3. (A) Minipterional craniotomy of 3.4 cm diameter. **(B)** Exposure of the dura, drilling of the anterior cranial base. **(C)** Opening of the dura, inferolateral exposure of the frontal lobe, Sylvian fissure and superior temporal gyrus, dissection of the Silvio valley to the optic-carotid and chiasmatic cistern. **(D)** Clipping of the aneurysm under microsurgical vision.

ETHICAL ASPECTS

Patient and family were informed about the teaching and intention to publish the case, obtaining informed consent, attached in the history under strict confidentiality.

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Disclosures

The authors report no conflict of interest concerning the materials or methods used in this study or the findings specified in this paper.

Author Contributions

Conception and design: All the authors. *Drafting the article:* Acha. *Critically revising the article:* Acha, Yaya-Loo, Yabar. *Reviewed submitted version of manuscript:* Acha. *Approved the final version of the manuscript on behalf of all authors:* Acha.

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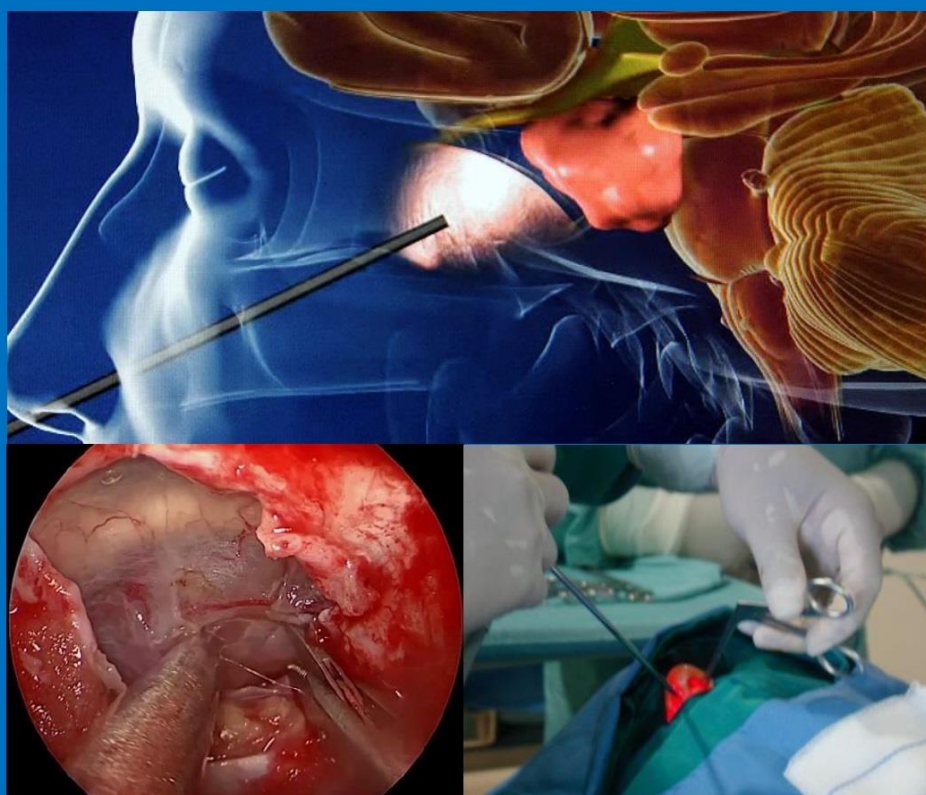
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