ISSN 2689-8268 | Volume 3

American Journal of Surgery and Clinical Case Reports

Research Article Open Access

Endoscopic Resection of orbital Apex Neurilemmoma with Freezing Technique - Research Article

Li J[1*], Zhang W[2], Huang Q[3] and Chen Y[4]

[1]Department of Ophthalmology, Peking University Shenzhen Hospital, Shenzhen, China

[2]Department of Ophthalmology, Peking University Shenzhen Hospital, Shenzhen, China

[3]Department of Ophthalmology, Peking University Shenzhen Hospital, Shenzhen, China

[4]Department of Ophthalmology, Peking University Shenzhen Hospital, Shenzhen, China

***Corresponding author:**

Jinying Li,
Department of Ophthalmology, Peking University Shenzhen Hospital, Shenzhen, Guangdong 518036, China, Tel: 86-0755-83923333;
Fax: 86-0755- 8392333;
E-mail: ljy951019@163.com

Received: 05 Apr 2021
Accepted: 26 Apr 2021
Published: 03 May 2021

Citation:

Li J, Endoscopic Resection of orbital Apex Neurilemmoma with Freezing Technique - Research Article. Ame J Surg Clin Case Rep. 2021; 3(2): 1-3.

[&]**Authors' contributed**:

Li J, Zhang W, Huang Q, Chen Y are contributed equally to this work.

Keywords:

Neurilemmoma; Surgical Method; Endoscope; Freezing Technique

1. Abstract

1.1. Purpose: We propose a new technique, endoscope with freezing technique, in resection of orbital neurilemmoma.

1.2. Methods: A 53 years old female patient suffered from visual acuity decline of left eye for one year. The best correct visual acuity of left eye was 2/20 and the proptosis of left eye was 14mm. Relative afferent pupillary block of left eye was positive. The visual field examination of left eye showed that visual field was influenced obviously. An occupying lesion with a size of 25*16*19mm was found within muscle cone in orbital apex of the left eye. The patient was underwent a surgery finally. We applied endoscope with freezing technique in the resection of the tumor.

1.3. Results: Following lateral incision of orbital bone wall of left eye, the tumor was resected totally with the application of endoscope and freezing technique. The patient's best corrected visual acuity was apparently improved.

Conclusions: Endoscopic surgery can provide sufficient lighting and visual space for surgeons, especially in exposing the orbital tumor directly. Neurilemmoma can be hopefully total resected when the freezing technique is applied together during surgery.

2. Introduction

Neurilemmoma, also known as schwannoma, which originates from Schwann cells of the peripheral nerve sheath, is a kind of benign, slow-growing and encapsulated tumor. It occurs mostly in adults between 30 to 70 years old [1]. Orbital neurilemmomas tend to arise not only from branches of the oculomotor, trochlear and abducens nerves, but also from sympathetic and parasympathetic fibers as well as the frontal branch of the trigeminal nerve. The origin of orbital neurilemmomas accounts for their location to be primarily present in the supraorbital region [2]. Orbital neurilemmoma is usually asymptomatic during its initial stages. However, visual function damage and ptosis will occur gradually as the tumor grows up. It is necessary to be conducted surgery when the orbital soft tissues are pressed obviously. Generally, the thorough surgical approach is mainly determined by the tumor anatomical location, the extension, and the type of lesion so as to avoid damage the surrounding neurovascular structures [3]. Lateral and anterior orbitotomy are widely used surgical approaches for orbital neurilemmoma [4]. The close connection with the surrounding tissues results optic nerve injury easily during operation. The tumor membrane is thin and crumbly. Consequently, it causes incomplete tumor removal and high recurrence rate once the tumor membrane is torn during operation, especially in case with cystic lesions. While endoscopic surgery has become an increasingly favored approach to ventral skull base pathology, its application in orbital

lesions has recently renewed scholastic interest as the next frontier of extended endoscopic surgery.

In our research, we propose a new surgical method, the combination of endoscopy and freezing technique, to resect orbital apex neurilemmom totally. It confirmed that the approach was safe and effective.

3. Methods

A 53 years old female patient suffered from visual acuity decline of left eye for one year. She did not complain eye redness, eye pain and diplopia, etc. Diseases of personal history and family history were negative. The examination of right eye was totally normal. The best correct visual acuity of left eye was 2/20 and the proptosis of left eye was 14mm. Besides, relative afferent pupillary block of left eye was positive and the color of optic disc in left eye seemed lighten. The visual field examination of left eye showed that visual field was defected obviously. An occupying lesion, with a size about 25*16*19mm, was found within muscle cone in orbital apex of the left eye under examination of orbital MRI and CT. Enhanced scan in CT showed little enhancement in central part of the mass. The examination of MRI revealed that the high signal was detected in T2 fat pressing series and equal signal was showed in T1 series. And enhanced scan showed heterogeneous enhancement and clear boundary of the mass. The optic nerve and superior rectus muscle were compressed and displaced. The patient was diagnosed with orbital apex tumor in left eye.

The patient was ordered a surgery that the lateral orbital wall was opened in left eye under general anesthesia. The surgical technique is described below. Histopathologic examination revealed a benign neurilemmoma. The orbital apex tumor was resected with endoscope and freezing technique. In period of follow-up, the patient's best corrected visual acuity improved to 18/20 and her relative afferent pupillary defect resolved. She did not develop diplopia. Humphrey visual field testing showed that mean deviation has improved to −4.20 dB with visual field index of 80% 1 month postoperatively.

4. Results

The surgical technique is detailed below. All procedures performed in studies were in accordance with the ethical standards of the Peking University Shenzhen Hospital committee and with the Helsinki declaration.

5. Techniques

The patient was under placed general anesthesia and blood pressure was controlled based on the bleeding situation during surgery. The incision, about 10mm, was made horizontally along the lateral skin of lateral canthus and it was extended to the lower eyelid. The subcutaneous tissue was exposed with a skin hook. Detacher was stripped gently to expose the lateral orbital periosteum. Then the periosteum was carved. The lateral orbital bone wall was incised with a chainsaw and the bone mass was put into 0.9% saline water. Afterwards, the large wing of sphenoid bone and superior orbital bone were polished to expose the orbital apex better. We confirmed the tumor position with application of preoperative imaging and navigation probe during surgery. The tumor tissue was exposed by gently pulling the lateral rectus muscle. A small hook knife was used to separate the surrounding tissues, including optic nerve, major vessels and muscle. The assistant used a condensing head (-70^0C, about 4mm in diameter) to contact the tumor surface with the help of endoscopic display screen. Then the switch of the freezing instrument was triggered and the tumor was connected with the condensing head firmly. While the tumor was pulled outside, the surgeon explored the adhesion with a small hook knife and isolated the tumor carefully. Finally, the tumor was totally resected. Observation of pupil and complete hemostasis were important during operation. The yellow tumor was in size of 3.5cm*2cm in vitro with complete capsule. The tissue was sent to pathological section for further examination. The incision bone of lateral orbital wall was fixed into the original location with 508 medical adhesive. Finally, the orbital periosteum, skin and subcutaneous tissue were sutured in situ.

6. Discussion

The resection of orbital apex tumor is a challenging work. It is known that the orbital apex is extremely deep and narrow in orbit and it is surrounded by thick and hard bone. Besides, there are some important nerves, blood vessels and muscles existing in the area. The application of conventional head lamp and microscope is difficult to achieve the satisfying visual field in operation, especially when the tumor is twined with the adjacent tissue. Carelessness will lead to serious complications. Therefore, orbital apex tumor has always been regarded as the "forbidden area" of orbital tumor surgery. The surgical removal of orbital neurilemmomas is required for patients with visual deterioration and remarkable proptosis while the asymptomatic patient can be closely followed. Currently, complete removal of the neurilemmoma is the only treatment without recurrence. However, the optic nerve may be injured even with careful surgical separation because orbital neurilemmomas is often adhesive with the surrounding tissues. The tumor is with relatively thin capsule, so the tissue of tumor can easily rupture during surgery, especially in cases with cystic degeneration [5]. We successfully removed the orbital apex neurilemmoma by endoscope combined with cryosurgery. The visual function of the patients recovered well without obvious complications.

Tumor location is the most important factor in selecting the surgical approach. Lateral orbitotomy is required for retrobulbar lesions [6,7]. In our case, the tumor was in the retro bulbar orbital apex and we chose deep lateral orbitotomy to expose tumor better. The recent development of endoscopic approaches has led us to consider their application for orbital tumors [8]. Accordingly,

we chose endoscopic surgery after lateral orbitotomy to expand the visual field of orbital apex. Meanwhile, the illumination and magnification were improved. The surgeon and assistant operated synchronously and accurately to reduce the complications, such as nerve and blood vessel injury. Intraoperative clamp might cause rupture of tumor capsule and cell implantation, which may cause tumor recurrence and malignant transformation. It was helpful to retain the tumor resection completely when the tumor was pulled by freezing technique. Finally, the tumor was resected. It has been reported that transnasal endoscopic approach can resect the tumor in deep orbit as the tumor locates in the medial side of optic nerve [9]. The tumor of our patient was located in the lateral side of the optic nerve. If the tumor was located in the medial side of the optic nerve, it could still be resected by transnasal endoscopic approach. However, transnasal approach combined with cryosurgery has not been reported yet.

Most orbital tumors can be excised by traditional lateral orbital surgery. There are some disadvantages of the traditional methods with headlamp and microscope, such as worse exposure of operation field, limited cooperation between team members, especially for some complex deep orbital tumors. The application of endoscopic technology will provide a relatively ideal way. Compared with the traditional surgery, the advantages of endoscopic surgery combined with cryosurgery are as follows: 1. The Endoscope provides better illumination and it can adjust the illumination angle to satisfy the requirement of operation. It is especially suitable for the operation of deep and narrow space of orbital apex. 2. Endoscope can provide 6~12 times of magnification, so surgical operations of deep stenosis can be carried out precisely without expanding the incision or multiple incision. The important blood vessels, nerves, muscles and other tissues can be protected commendably. 3. The technique is more conducive for team cooperation. Surgeons can see the actual situation of the operation directly with endoscopic screen. The assistant works closely with the chief surgeon and it is also conducive to clinical practice teaching. 4. The tumor can be resected completely with application of freeze technique and the risk of recurrence of tumor reduces greatly, especially for brittle and fragile schwannoma.

The following problems should be paid attention to in endoscopic surgery combined with cryosurgery: 1. There are many important blood vessels and nerves in the orbital apex. Accidental operation can lead to serious complications. Consequently, the surgeon must master the orbital anatomical characteristics well and have superb and delicate endoscopic operation skills. 2. The rectus muscle might be cut off to relieve the tension of extraocular muscle from orbital fat which is helpful to expose the tumor. 3. It is not suitable to pull the tumor forcibly with condensing head so as to avoid injury of nerves and blood vessels. Gentle shaking and pulling are suitable to separate the bonded parts and the tumor can be resected finally. If the tumor is difficult to separate, palliative decompression of orbital apex can be performed. 4. Intraoperative bleeding may affect the operation and postoperative bleeding may lead to increased orbital pressure and loss of vision. Thus, hemostasis is important in the whole process of surgery.

There are still some shortcomings in our operation. Firstly, it is necessary to increase the number of surgery cases to verify the rationality of the operation and the risk of complications. Secondly, orbital endoscopic surgery requires that the surgeon must master the orbital anatomical characteristics and have superb and delicate endoscopic operation skill. So the learning process is difficult and long. Last but not least, the condensing head cannot reach the deep orbit through the nasal cavity at present.

7. Conclusion

Endoscopic surgery can provide sufficient lighting and visual space for surgeons, especially in exposing the tumor directly. The size and boundary of the tumor can be assessed better and then the surgeon can separate the tumor from surrounding tissues. The tumor can be totally resected with application of freezing technique. With the ophthalmologists' continuous mastery and proficiency of endoscopic technology and continuous improvement of surgical instruments, the application of endoscopic technology in orbital tumor surgery will be more extensive.

References

1. Hassan WM, Bakry MS, Hassan HM, Alfaar AS. Incidence of orbital, conjunctival and lacrimal gland malignant tumors in USA from Surveillance, Epidemiology and End Results, 1973-2009. Int J Ophthalmol. 2016; 9(12): 1808-13.
2. Konrad EA, Thiel HJ. Schwannoma of the orbit. Ophthalmologica. 1984; 188(2): 118-27.
3. Dziedzic TA, Anand VK, Schwartz TH. Endoscopic endonasal approach to the lateral orbital apex: case report. J Neurosurg Pediatr. 2015; 16(3): 305-8.
4. Schick U, Bleyen J, Hassler W. Treatment of orbital schwannomas and neurofibromas. Br J Neurosurg. 2003; 17(6): 541-5.
5. Chen MH, Yan JH. Imaging characteristics and surgical management of orbital neurilemmomas. Int J Ophthalmol. 2019; 12(7): 1108-1115.
6. Irace C, Davi G, Corona C, Usai S, Candino M, Gambacorta M. Isolated intraorbital schwannoma arising from the abducens nerve. Acta Neurochir (Wien). 2008; 150(11): 1209-10.
7. Rato RMF, Correia M, Cunha JP, Roque PS. Intraorbital abducens nerve schwannoma. World Neurosurg. 2012; 78(3-4): 375 e1-4.
8. Yao WC, Bleier BS. Endoscopic management of orbital tumors. Curr Opin Otolaryngol Head Neck Surg. 2016; 24(1): 57-62.
9. Jeon C, Hong SD, Woo KI, Seol HJ, Nam DH, Kong DS, et al. Use of endoscopic transorbital and endonasal approaches for 360 degrees circumferential access to orbital tumors. J Neurosurg. 2020; 1-10.