

Permanent treatment suture for the treatment of congenital nerve palsy of III nerve

Sutura de tração permanente para tratamento de paralisia congênita de III nervo

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ABSTRACT

Paralysis of the third cranial nerve represents the most complex and challenging paralytic squint. The cases of complete III nerve paralysis encourages the use of certain strabismus surgery techniques in order to keep eye in primary position of gaze. However, the therapeutic possibilities are limited and complex and the surgical treatment tends to hypocorrection and frequent recurrences in the long term. Complete and congenital involvement of the third cranial nerve requires surgeries for exotropia, hypotropia and ptosis. Among the surgical techniques already described, we choose a modification of the surgical technique of recession-resection, which occurred in a single surgical time, being suffice to achieve aesthetic objective. This paper reports the positive result of the maintenance of caruncle traction suture as surgical treatment of congenital III nerve paralysis.

Keywords: Strabismus /etiology; Paralysis of the oculomotor nerve; Traction suture; Case reports

RESUMO

A paralisia do terceiro nervo craniano representa o estrabismo paralítico de tratamento mais complexo e desafiador. Os casos de paralisia completa III par incitam o uso de certas técnicas de cirurgia de estrabismo destinadas a manter o olho voltado para a posição primária do olhar (PPO). Entretanto, as possibilidades terapêuticas são limitadas e complexas e o tratamento cirúrgico tende a hipocorreção e recorrências frequentes a longo prazo. O envolvimento completo e congênito do terceiro nervo craniano requer cirurgias para a exotropia, hipotropia e ptose. Dentre as técnicas cirúrgicas já descritas, optou-se pela realização de uma modificação da técnica cirúrgica de recuo-ressecção, que deu-se em único tempo cirúrgico, sendo suficiente para alcançar o objetivo estético. Este trabalho relata o resultado positivo da manutenção de sutura de tração à carúncula para tratamento cirúrgico de estrabismo paralítico congênito de nervo oculomotor de longa data.

Descritores: Estrabismo/etiologia; Paralisia de nervo oculomotor; Sutura de tração; Relatos de casos

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INTRODUCTION

Congenital and isolated paralysis of the third nerve is rare, usually unilateral and may occur alone or in association with other neurological and systemic abnormalities.^(1,2) The most frequently mentioned mechanism is perinatal injury to the third peripheral nerve. However, they may be due to the congenital absence of the nerve and/or nucleus, and be followed by neurological dysfunctions.⁽¹⁾ All patients have some degree of ptosis and ophthalmoplegia, and approximately all have pupillary involvement. The pupil is rarely spared. Amblyopia is common. Many cases are spontaneous, but family cases were described.⁽³⁾

The oculomotor nerve or third cranial nerve constitutes one of the most complex efferent pathways of the visual system.⁽⁴⁾ It invigorates all extrinsic ocular muscles except the superior oblique and lateral rectus, and is considered the most important nerve for ocular motility. Complete paralysis of this nerve creates a clinical condition of complex presentation. This paralysis causes a marked exotropia, absence of vertical movements, mild hypotropia, intrusion, blepharoptosis, mydriasis, and accommodation paralysis.⁽⁵⁾ In addition, the lateral rectus in the affected eye, unopposed to its action, will initially keep the eye in divergent position against the orbital static forces that try to bring it back to the center.⁽⁶⁾

Eventually, the lateral rectus will contract in this reduced position, and the orbital static forces affected by the orbital control ligaments⁽⁷⁾ will also adapt to the new position and prevent the eye from returning to the center. In order to maintain a cosmetically satisfactory result in this situation, it is necessary to minimize the action of the lateral rectus and make the aforementioned orbital static forces adapt to the new position of the eye. This can be achieved by using tensile sutures to keep the eye in the desired position long enough for this to happen, so that when the sutures are removed the eye will not diverge again.⁽⁶⁾

The present study reports the entire approach of a case of congenital paralysis of the third nerve, from the anamnesis, physical examination, surgical plan preparation, and surgical treatment (with description of the accomplishment of a technical modification) to the analysis of the result for the correction of strabismus resulting from this ocular pathology.

CASE REPORT

Female patient, 36 years old, born in São Luís - Maranhão, Brazil, with paralysis of III congenital cranial nerve, was followed by a general ophthalmologist and referred to appointment for strabismus. Patient reported strabismus and blepharoptosis since 6 months of age. No personal pathological or family history worth noting.

Cranium-encephalic computed tomography (CT), cranium-encephalic magnetic resonance imaging and of the orbits revealed no significant changes.

At the preoperative exam, the patient had BCVA (best corrected visual acuity) of 1.0 in the right eye (RE); Movement of hands in left eye (LE). Static Refraction: RE plane; + 150Å esf. RE. Left pupil on average mydriasis with pupil slightly reactive to light, without other changes in the anterior segment, intraocular pressure of 10mmHg in both eyes.

The indirect binocular ophthalmoscopy exam under medicated mydriasis presented normal retina. Evidence showed XT 150 prismatic diopters (PD) in the primary position of the eye (Krimsky + Hirshberg) (Figure 1). At ocular motility

examination: Left medial rectus hypofunction of -7, Left medial rectus hyperfunction of +4, Left upper rectus hypofunction of -4, and Left lower rectus hypofunction of -3. XT 90 DP (positive passive duction). The test of forces generated showed the absence of force when the patient was asked to adduce the LE, also in its elevation and depression. Finally, strength was only perceived when the patient was asked to abduct the LE, evidencing that only this muscle remained with its function preserved, which proved to be paralysis and non-paresis of the III cranial nerve on the left, in this particular case complete, since it was associated to blepharoptosis and mydriasis of the LE. It is probable that the function of the upper left oblique muscle was preserved, since it was innervated by the IV cranial pair. However, since the eye was abducted, it was not possible to evaluate it.



Figure 1: Preoperative

The surgery proposed and performed was the left lateral rectus recess of 8.0 mm + left medial rectus resection of 8.5 mm, along with definitive traction suture to the caruncle with mersilene (5.0). Then, 4 mg of subtenonian triamcinolone were injected. In this case, the suture fixation site was changed (fixation to the caruncle), and thus the patient remained with a permanent traction suture.

After 30 days of surgical procedure (Figure 2), the patient had: XT 12 PD and HoT LE of 10 PD, nine months after surgery: XT20 PD and HoT 10 PD in the LE.



Figure 2: Thirty days after surgery

The last evaluation 8 years after the procedure (Figures 3 and 4) showed BCVA: 1.0 RE; Movement of hands LE and J1 for near sight. With static refraction of +2.25 -1.50 cyl 15° RE and weight in LE (addition of +2.75 BE). XT of 10PD in the left eye in the primary position of the eyes (PPE). Duplications showed hypofunction of -2 RME and hypofunction of -2 RLE. Patient remains stable, satisfied with surgical outcome, without granuloma or yarn rejection.

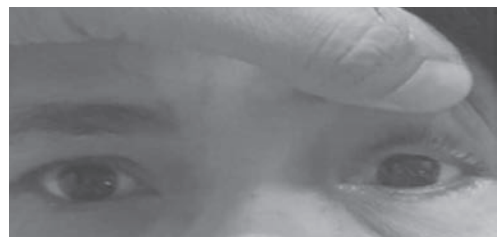


Figure 3: Eight years after surgery

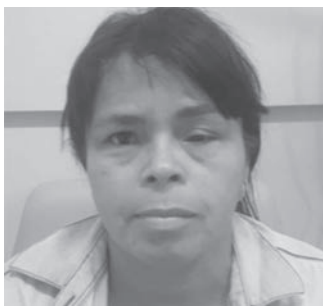


Figure 4: Eight years after surgery

DISCUSSION

Numerous studies in the literature agree that the goal of surgery is to achieve the best aesthetic result in PPE, which requires more than one surgical time, because the hypocorrection and recurrences are frequent in the long term. There is no adequate surgery to restore the sensorimotor balance, therefore, some authors recommend electing simple surgical procedures to avoid undesirable side effects with some more aggressive surgical techniques.⁽⁸⁾

Several surgical approaches have been described to address this problem. Jackson was the first to suggest the transplant of the upper oblique tendon for insertion of the medial rectus.⁽⁹⁾ Scott⁽¹⁰⁾ suggested in 1977 a modification in which the upper oblique tendon is brought to a point 2 mm anterior to the median insertion of the upper rectum without trachelectomy. Saunders and Rogers⁽¹¹⁾ reported unsatisfactory results with the Scott procedure in four cases, either by inadequate horizontal alignment, postoperative hyper-deviation, or paradoxical eye movements. Gottlob, Catalano and Reinecke⁽¹²⁾ reported their results in 7 patients with superior oblique transposition and large lateral rectus recessions.⁽⁶⁾

Surgery for complete third nerve paralysis may involve supra-maximal recession and resection. This can be combined with transposition of the superior oblique and approach of the contralateral eye.⁽¹³⁾

Anchoring the eye medially using an orbital fascia or fascia lata graft was effective, but this surgical technique is difficult and highly invasive. In 1991, Kauffmann⁽¹⁴⁾ introduced lateral rectus muscle separation for complete oculomotor paralysis (variations of this technique have been described), describing 2 cases with total third and fourth paralysis. He divided the lateral rectus muscle and transposed its upper and lower halves to the retroequatorial point, 20 mm from the limbus, near the superior and inferior nasal vortex veins.⁽¹⁵⁾

The use of traction sutures as a complement to strabismus surgery has a long history. Von Noorden⁽¹⁶⁾ cites descriptions of traction sutures by Dieffenbach in 1848 and Von Graefe in 1853. Later, Villaseca⁽¹⁷⁾ and Callahan⁽¹⁸⁾ described success cases with traction values left in situ for a few days. Khaier, Dawson and Lee⁽⁶⁾ described the use of traction sutures left in situ for six weeks in 33 patients with third nerve paralysis; an initial report of this procedure was published in 1996.⁽¹⁹⁾

In the commonly described surgical technique, traction sutures are passed through the insertion of the upper and lower straight muscles besides the sclera and taken through the upper and lower fornices to the medial corner where they are brought to the surface through the skin. The sutures are then pulled to bring the eye into adduction, and then they are tied to plastic supports. In general, traction sutures are left in situ for six weeks.⁽⁶⁾

Daniell et al. concluded that supra-maximal horizontal recession-resection combined with traction sutures left over for six weeks is a procedure that restores the eye to PPE, becoming a procedure of choice in a case of fixed differential strabismus⁽¹⁹⁾

In the case described, we chose for a modification of the surgical technique usually employed, which took place in a single surgery, with fixation of the suture to the caruncle and its maintenance, which proved to be an effective technique modification to place the strabismic eye in the primary position when associated to the extensive recession-resection of the lateral and medial rectus muscles. There were no complications due to the maintenance of the traction suture, such as local infection, conjunctival hypertrophy, granuloma and chesse wiring effect, already described in temporary sutures and without the inconvenience of recurrence after removal.⁽⁶⁾

REFERENCES

- Langmann A, Lindner S. Congenital third nerve palsy in septo-optic dysplasia. *Br J Ophthalmol.* 2004;88(7):969.
- Schumacher-Feero LA, Yoo KW, Mendiola Solari F, Biglan A. Third cranial nerve palsy in children. *Am J Ophthalmol.* 1999;128(2):216-21.
- Brazis PW. Isolated palsies of cranial nerves III, IV, and VI. *Semin Neurol.* 2009 ;29(1):14-28.
- Dantas A. M. Anatomia funcional do olho e seus anexos. Rio de Janeiro: Revinter; 2002.
- Prieto-Díaz J, Souza-Dias C. Strabismus. 4 ed. United States of America: Butterworth Heinemann; 2000.
- Khaier A, Dawson E, Lee J. Traction sutures in the management of long-standing third nerve palsy. *Strabismus.* 2008;16(2):77-83.
- Metz H, Yee D. Third nerve palsy: superior oblique transposition surgery. *Ann Ophthalmol.* 1973; 5(2):215-8.
- Sanz PM, Marañón G. Tratamiento quirúrgico de las parálisis del iii par. *Arch Soc Esp Oftalmol.* 2005; 80(3):155-62.
- Weiner M, Scheie H G. Surgery of the eye. 3rd ed. New York: Grune & Stratton;1952. p. 405-11.
- Scott AB. Transposition of the superior oblique. *Am Orthopt J.* 1977; 27:11-14.
- Saunders RA, Rogers GL. Surgical management of oculomotor nerve palsy. *Am J Ophthalmol.* 1991; 111(5):658-9.
- Gottlob I, Catalano R A, Reinecke R D. Surgical management of oculomotor nerve palsy. *Am J Ophthalmol.* 1991;111(1):71-6.
- Singh A, Bahuguna C, Nagpal R, Kumar B. Surgical management of third nerve palsy. *Oman J Ophthalmol.* 2016;9(2):80-6.
- Kaufmann H. [“Lateralis splitting” in total oculomotor paralysis with trochlear nerve paralysis]. *Fortschr Ophthalmol.* 1991;88:314-6. German.
- Gokyigit B, Akar S, Satana B, Demirok A, Yilmaz OF. Medial transposition of a split lateral rectus muscle for complete oculomotor nerve palsy. *J AAPOS.* 2013;17(4):402-10.
- Von Noorden GK. Binocular vision and ocular motility. 3rd ed. St Louis: Mosby; 1985.p. 526.
- Villaseca A. Strabismus fixus. *Am J Ophthalmol.*1959; 48:751-62.
- Callahan A. The arrangement of the conjunctiva in surgery for oculomotor paralysis and strabismus. *Arch Ophthalmol.* 1961; 66(2):241-6.
- Daniell MD, Gregson RM, Lee JP. Management of fixed divergent squint in third nerve palsy using traction sutures. *Aust N Z J Ophthalmol.* 1996; 24(3):261-5.

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