

**FREE TENOTOMY IN VERY LARGE
ANGLE HORIZONTAL STRABISMUS**

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(Case report)

INTRODUCTION

Diefenbach (2,7) introduced free tenotomy for the first time in 1848. The result of this procedure was often an overcorrection, and became unpopular. In 1853 Von Graefe (2,7) revived this procedure by improving the surgical technique. But the result was still disappointing, because of its unpredictability. Free tenotomy was then replaced by recession (Prince 1887). This procedure prevents excessive retraction and permits grading of the weakening effect. (2)

Anyhow to day free tenotomy is still in use for unusual cases, such as :

- A-V pattern, (tenotomy of the oblique muscles). (2,3,7,8)
- Medial rectus paresis, (tenotomy of the lateral rectus muscle). (2,7)
- Thyroid myopathy, (tenotomy of the inferior rectus). (7)
- Strabismus fixus, (tenotomy of the medial recti). (7,8)

Cases with very large angle horizontal deviation were special problem. Most of these cases need excessive management such as :

- operation on the four horizontal rectus muscles. (3,5,7,8)
- large bimedial recession in esotropia . (6,9,11)
- excessive recess-resect in exotropia with deep amblyopia. (7,8)
- true transposition procedure as reoperation in recurrent strabismus. (1)

Four cases of free tenotomy in very large angle horizontal strabismus (deviation angle 75 prism diopters or more) for cosmetic purpose will be presented.

Surgical procedure.

Conjunctival incision were limbal approach. The muscle was severed at it's insertion without dissectioning the intermuscular membrane and check ligament. After cutting the muscle, the conjunctiva and Tenon's capsule were sutured without recession. On three eyes , the antagonist muscle was resected until the position of the eye was aligned. On one eye, no resection was done.

CASE REPORTS

Case 1. A 4 1/2-year-old girl, complained by her parents that the left eye turned in since 4 years ago. Examination revealed left esotropia of 95 prism diopters. Visual acuity 6/6 OD and 6/30 OS; Retinoscopic refraction was normal OD and 3 D hypermetropia OS. Due to amblyopia, the left eye vision was not improved by correction. Ambliopic treatment failed. Duction and version were normal with mild limitation of abduction of the left eye.

Free tenotomy of the medial rectus and 10 mm resection of the lateral rectus were done. One week after the operation, she still had 10 prism diopters of esotropia, which remained the same until one year later for distant and near.

Case 2. A 40-year-old male came with his left eye deviated since he was a child. Four years ago operation had been done elsewhere. No report of the operation was available. Examination revealed 90 prism diopters left exotropia. Visual acuity was 6/6 OD, 6/20 OS with correction. (S -0.50 = C + 2.25 125 degrees). Duction and version were normal with mild limitation in adduction on the left eye.

Free tenotomy of the lateral rectus and 6 mm resection of medial one was done. One week after surgery he had 5 prism diopters exophoria. Two weeks postoperatively, the exotropia increased to 20 prism diopters for distant and near. The deviation remained constant four months later.

Case 3. A 20-year-old female came with her right eye deviated since age two. Examination revealed right esotropia. Deviation angle was 85 prism diopters. Corneal scar was seen on the right eye. Visual acuity was finger counting OD, and 6/6 OS. Duction and version were normal with mild limitation abduction on the right eye.

Free tenotomy was done on medial rectus and lateral rectus resection 6 mm in the right eye. One week after operation she had 10 prism diopters exotropia. Two weeks postoperatively the deviation remained constant. Two months postoperatively, the patient had 25 prism diopters exotropia for distant and 10 prism diopters for near.

Case 4. A 19-year-old female came with left esotropia since her birth. Examination reveal 75 prism diopters left esotropia. Visual acuity was 6/6 OD, 6/7 OS (with S+0.50 correction). Limited abduction of the right eye and mild abduction on the left eye.

Free tenotomy was done the medial rectus of the left eye without resection of the antagonist muscle. One week postoperatively she had 15 prism diopters esotropia for distant and near. Two months later the esotropia remained constant.

DISCUSSION

In free tenotomy the muscle is severed at the insertion, without dissection of attachment on tenon capsule, intermuscular membrane and check ligament, to prevent extended muscle retraction.(2,3). In this condition, the muscle contact directly on to the sclera and attached on it by cicatrical tissue later.

The attachment of the muscle on the sclera in strabismus surgery, usually fixes securely by granulation tissue after five to seven days (Knapp) (4). If the retraction is distant from the insertion, there will be less possibility of its attachment to the sclera, and possibly attaches to the fascia on the orbital wall. The condition makes the function of muscle ineffective.

Helveston (3) claimed that, if free tenotomy was performed including dissection of intermuscular membrane minimal duction would result. On the other hand, if it was done without dissectioning the membrane, some duction will be obtained.

Duke Elder (2) emphasized the special indication of free tenotomy on lateral rectus muscle in medial rectus paralysis, and on oblique muscle in A-V pattern.

Recess-resect procedure in one eye, both exo or esotropia will give correction of about 50 prism diopters or less. If the deviation is 50-75 prism diopters, three muscles to be operated on, and four muscles for 75 prism diopters or more. (3,7,8)

As far as I know, there is no detailed information from available literatures concerning the success rate of free tenotomy. Some authors mentioned about the result of operation in large and very large deviation with different procedures.

Lee & Dyer (5) performed bimedial recess and bilateral resect in large angle esotropia (angle deviation 50 prism diopters or more) which gave 61% success rate (22 in 36 cases). 39% (14 cases) were undercorrected (7 cases) and overcorrected (7 cases). Successful cases were older (mean age 23 months). And cases with over or undercorrection were younger (mean age 12 months).

Scott's (9) made a guidance for strabismus surgery according to the angle of deviation such as below:

deviation angle (prism diopters)	bimedial recess mm from limbus	lateral resect mm	bilateral resection mm
55	11	4 - 5	---
60	11	6	---
65	11	7	---
70	11	---	5
75	11	---	6
80	11	---	7
90 - 100	11	---	8

His results by following this guide in 48 cases were :

- 75 % orthophoria more or less 10 prism diopters.
- 16.7% overcorrection
- 8.3% undercorrection

Hess and Calhoun cited by Scott (9) performed large bimedial recess in 30 cases with large angle esotropia.

The result were :

- 84 % success rate by bimedial recess 6 mm in cases with mean deviation angle 57 prism diopters.
- 60 % success rate by bimedial recess 7 mm in mean deviation angle 78 prism diopters.
- One case of 90 prism diopters deviation angle with bimedial recess 8 mm was undercorrected.

Nelson and his colleague (6) proposed bimedial recession to manage congenital esotropia and claimed that this procedure gave the same result as with operation on three muscles. Beside that he said that bimedial recess 6-7 mm would not give limitation of adduction convergence postoperatively. The result by this procedure was 83.5 % success rate in congenital esotropia cases with angle of deviation 50 prism diopters or more.

Weakley et al. (11) performed large bimedial recess (7 mm) on large angle congenital esotropia patient. Mean angle of deviation was 74 prism diopters (range 65-105). The success rate was higher (85%) in the shorter follow up time (6 weeks), and was 75% after 18.2 months.

Parks (8) said that in large angle exotropia excessive recess-resect were needed, with the possible risk of losing normal abduction postoperatively.

Diamond (1) introduced the true transposition procedure where the resected muscle after resection was added to the recessed muscle. He performed this procedure for reoperation in large angle deviation and irreversible amblyopia. The follow up time of his patient was 9-14 months. He suggested that large angle deviation could be managed by operation on two muscles only.

He had performed this procedure on three cases, in which two cases of exotropia had angle of deviation 90 and 65 prism diopters. In the first case, the deviation angle was 4 prism diopters one week after the operation, and 9 prism diopters 9 months later. In the second case, exotropia was 5 prism diopters at distant and near one week after the operation, and fourteen months postoperatively, 10 prism

diopters at distant and 14 prism diopters at near. In the third case, with 50 prism diopters esotropia, the result was 8 prism diopters right exotropia at distant and near, one year after operation.

Scott said that the goal of strabismus surgery should be to obtain good ocular alignment with fewest number of procedure; multiple procedure not only expensive but also increase operative and anaesthetic risk of the patient. (9)

The operation we had performed, using free tenotomy procedure with or without resection on the antagonist muscle in the four cases, was based on Scott's principle, and for cosmetic purposes only.

Base on the stage cure of strabismus by Uemura & Akiyama (10), these result were cosmetically satisfactory in 3 cases and in one case orthophoria for near and exotropia of 25 prism diopters at distant were was still present.

The follow up time was two months to one year.

According to literatures, the result of free tenotomy was unpredictable. Anyhow in very large angle horizontal strabismus it may be use with cosmetically satisfactory result. If under or overcorrection resulted later, we could reoperate on the good muscle of the other eye.

The advantage of this procedure are:

1. It can manage or correct very large angle horizontal strabismus with manipulation of two muscles in one eye only.
2. The operation is faster and easier to do.
3. Less anasthetic and operation risk.
4. If reoperation is needed, it could be done in the other sound (unscarred) eye.
5. Low cost

RESUME

Free tenotomy with or without resection on the antagonist muscle has been presented. The result were cosmetically satisfactory, almost the same as what had been achieved by some authors.

Whether the procedure will be generally accepted in the future, further studies will be needed.

LITERATURE

1. Diamond G.R. : True transposition procedures.
J.Pediatr. Ophthalmol. Strabismus
27 : 153 - 156, 1990.
2. Duke-Elder S.S : Ocular motility and Strabismus.
Vol.VI. Henry Kimpton, London
497 - 498, 1976.
3. Helveston E.M : Atlas of strabismus Surgery.
The C.V.Mosby Company.St.Louis, Missouri
sec.ed : 58 - 60, 1977.
4. Knapp F. : Lost Muscle.
In Symposium on Strabismus.
Transaction of the New Orleans Academy of
Ophthalmology, The C.V. Mosby Company,
St.Louis : 301 - 306, 1978.
5. Lee D.A. & Dyer J.A : Bilateral medial rectus recession
and lateral rectus muscles resection in
the treatment of congenital esotropia.
A.J.O. 95 : 528 - 535, 1983.
6. Nelson L.B. et al : Congenital Esotropia.
Survey Ophthalmol. 31 : 363 - 383, 1987.
7. Noorden G.K.V. : Burian - Von Noorden's Binocular Vision
and Ocular Motility.
sec.ed. The C.V.Mosby Company, St.Louis-
London. 449 - 487, 1980.

8. Parks M.M. : Ocular Motility and Strabismus.
Medical Department Harper and Row,
Hagerstown, Maryland. 121, 1975.
9. Scott W.E. et al : Surgery for large-angle congenital
esotropia.
Arch Ophthalmol. 104 : 374 - 379, 1986.
10. Uemura Y. & Akiyama K. : Criteria for cure in strabismus.
J.Ocul. Ther. Surg. 4 : 80 - 82, 1985.
11. Weakley et al : Seven - millimeter bilateral medial rectus
recession in infantile esotropia.
J.Pediatr.Ophthalmol. Strabismus.
28 : 113 - 115, 1991.