Surgical Treatment of Intermittent Exotropia

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Sixteen patients with intermittent exotropia were followed for one to three years after bilateral 7 mm recessions of the lateral recti. These patients had the following preoperative characteristics, when measurable:

1. Good vision in each eye (15 of 16 had 20/30 or better with best correction).
2. Fusion, as demonstrated by the Worth 4-dot test at distance and near, and/or the Wirt fly test for stereopsis.
3. Manifest exotropia for far gaze (six meters) only, or exotropia produced by cover-uncover test.
4. Normal AC/A ratio (+3 for near test).

This type of intermittent exotropia was referred to by Duane as “divergence excess.” In this series, true exotropia never appeared during near measurements, even when accommodation was neutralized by +3.00 lenses. Near awareness, therefore, may be responsible for maintaining convergence.

Since an almost normal sensory mechanism is present, therapy directed toward this mechanism is of little value. Dunlap reported no cures from orthoptic treatment. Of the 100 surgically treated intermittent exotropias Dunlap surveyed, 34 were undercorrected and 9 were overcorrected. These were classified as “poor results” and represented 41 per cent of the bilateral lateral rectus resections and 27 per cent of the recess-resect procedures. The concern here is to reduce the number of undercorrections which, although less cosmetically apparent, are merely a continuation of the preoperative situation.

Burian reported 38 patients with surgically treated intermittent exotropia of the divergence excess type (Table I). His figures also demonstrate that the most common result of bilateral recession of the lateral recti is undercorrection. Although Hardesty’s paper is concerned with overcorrection of intermittent exotropia, his figures show that undercorrection is far more common.

<table>
<thead>
<tr>
<th>TABLE I</th>
<th>SURGICALLY TREATED INTERMITTENT EXOTROPIA*</th>
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<tbody>
<tr>
<td>Patients</td>
<td>No.</td>
</tr>
<tr>
<td>Overcorrected</td>
<td>4</td>
</tr>
<tr>
<td>Excellent</td>
<td>6</td>
</tr>
<tr>
<td>Good</td>
<td>12</td>
</tr>
<tr>
<td>Fair to Poor</td>
<td>16</td>
</tr>
</tbody>
</table>

*Modified from Burian

According to Scobee: “The amount of correction from the same operation in all cases (i.e., bilateral recession of the lateral rectus muscle to the equator) is directly proportional to the amount of the deviation present originally.” This dictum was pursued by choosing a
standard procedure (7 mm bilateral lateral rectus recession) not influenced by the magnitude of deviation. This, in effect, reduces the variables. Birth history, age at onset, age of the patient at the time of correction, time interval between onset of turn and surgery, refractive error, and the amount of deviation at six meters or one-third meter Dunlap feel have no effect.

Results

Only patients who had postoperative fusion for distance and orthophoria were considered cured. In this series, 11 of 16, after the primary procedure, and 1 secondary esotropia after the second operation, fell into this category (Table II).

<table>
<thead>
<tr>
<th>No. of Patients</th>
<th>AX(T)</th>
<th>AE(T)</th>
<th>Cured</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>2</td>
<td>3</td>
<td>11</td>
</tr>
<tr>
<td>2° procedure</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>for ET (advance one lateral rectus)</td>
<td>1</td>
<td></td>
<td></td>
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</tbody>
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*Ballen

Analysis

Jampolsky, Knapp, and Burian had similar experiences in that approximately 10 per cent of their cases were overcorrected, and one-third were undercorrected since the exotropia remained at distance despite no deviation, or intermittent deviation, with fusion at near.

It is concluded that bilateral equatorial recession of the lateral recti will give good results (phoria and fusion at distance). This is true in more than 60 per cent of the patients in this series. In one patient, advancement of the lateral recti reduced a secondary esotropia to esophoria.

Case Histories

1. **BT, 12 yrs. (Date of surgery underlined.)**
   1/2/68: Vision 20/20 OU; LXT-20 P.D. Fusion and stereopsis for near. Diplopia for red glass and 4 dot test at distance.
   4/4/68: Bilateral 7.0 mm recession lateral recti.
   4/6/68: AET for distance and near.
   4/25/68: No tropia on alternate cover for distance and near.
   10/19/68: $S^1=12$ P.D.; $S=0$.

2. **KJ, 11 yrs.**
   10/24/66: Orthoptics 20/20 OU; XT=30 P.D.; XT$^1=20$ P.D.; NPC good with fusion for near.
   1/27/66: Bilateral 7.0 mm recess.
   2/1/66: ET$^1=10$ P.D.; ET=0.; PI 0.06% nightly.
   9/7/66: Vision 20/20 OU Esophoria with PI 0.06% 2 wks h.s.
   2/16/67: Vision 20/20 OU; $S^1=12-14$ P.D.; S=0.2.00 OU for reading. $S^1=4$ P.D. and no diplopia.
   10/2/67: Vision 20/20 OU; LE(T)$^1=16$ P.D.; LE(T)-0 P.D. Fuses with +2.00 reading glasses and has 30% stereopsis on the Wirt fly test.

<table>
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<tr>
<th>TABLE III</th>
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<tr>
<td>COMPARISON OF RESULTS</td>
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<tr>
<td>Perfect or Excellent (%)</td>
</tr>
<tr>
<td>Burian and Spivey</td>
</tr>
<tr>
<td>Scobee</td>
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<tr>
<td>Dunlap</td>
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<tr>
<td>Raab and Parks$^7$</td>
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<tr>
<td>Ballen</td>
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<tr>
<td>(after 2° procedure)</td>
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12/15/67: Left lateral rectus advancement 3.0 mm.

12/19/67: Alternate cover, no ET.  
11/27/68: Alternate cover negative. No diplopia. X¹=0 P.D.; X=6 P.D.
5/15/69: X¹=12 P.D.; X=12 P.D. No tropia.

3. KY, 4 yrs.
12/5/67: Vision: Right 20/25; Left 20/40. With best correction (atropine): Right 20/20; Left 20/40. LXT-20 P.D.; X¹=0 P.D.
3/28/68: Bilateral 7.0 mm recession.
4/11/68: Alternate cover, small ET for near.
4/8/68: Alternate cover at 10 meters, no XT; at 6 meters, no XT; at 38 cm S¹=6 P.D.
5/4/68: Alternate cover, intermittent AXT-15 P.D.
5/17/69: Vision: Right 20/30; Left 20/40. X¹=0 P.D.; X=10 P.D. No tropia. Stereopsis, fusion - near and far.

4. JC, 12 yrs.
4/14/65: Vision: Right 20/20; Left 20/30. Alternate cover, AXT=16 P.D.; AX(T)=18 P.D. Fusion and primary stereopsis.
7/27/65: Bilateral 7.0 mm recession.
8/2/65: Vision: Right 20/20; left 20/25. Alternate cover, AX(T)=10 P.D. for distance and X¹=0 P.D. for near.
9/2/65: Alternate cover, X¹=10 P.D.; X=5 P.D.

5. JOK, 3 yrs.
5/5/66: LXT¹=0 P.D.; LX(T)=30 P.D. Squints in the bright light. Poor NPC. Atropine refraction, moderate hypermetropia.
6/24/66: Bilateral 7.0 mm recession.
9/12/68: Vision: Right 20/30; Left 20/40 with and without correction. Patch right eye.
11/21/68: Vision: Right 20/30; Left 20/40. Alternate cover, intermittent exotropia for distance 10 P.D. Fuses 4 dot near and far with stereopsis for near.

6. AS, 4 yrs.
10/3/67: AXT=16 P.D.; AXT¹=0 P.D. Wear-

ing -1.50 for therapy. Atropine examination, moderate hypermetropia. No glasses for three months.
1/23/68: Vision: Right 20/30; Left 20/30. Fusion, stereopsis at 33 cm. AET=20 P.D. for distance with diplopia and AX(T)=0 P.D.
4/23/68: Vision: 20/30 OU. Fusion and stereopsis for near. Diplopia for distance. AX(T)=20 P.D. for distance; AX¹=0 P.D.
7/30/68: Bilateral 7.0 mm recession.
8/6/68: On DFP for ET; (8/12/68–Telephone call: Vomits after instillation of DFP.)

8/14/68: Vision: 20/40 in each eye. Fuses red-green, distance and near.
8/28/68: Vision: 20/30 OU; X¹=0 P.D.; X=4 P.D. Alternate cover, no XT.
12/5/68: Vision: Right 20/30+; Left 20/30+. Fuses with stereopsis of 80% at near. Alternate cover, no XT.

7. MS, 7 yrs.
10/7/65: Vision: 20/20 OU. Alternate cover X(T)=20 P.D. for distance. X¹=0 P.D. NPC good. Cycloplegic refraction, moderate hypermetropia; 20/20 OU.
12/2/65: Bilateral 7 mm recession.
12/13/65: X(T) for distance.
12/23/65: Alternate cover negative.
10/24/67: Alternate cover at 20 ft.; AX(T)=20 P.D. Vision: 20/60 OU; -1.00 for each eye; -20/20 OU.

8. DP, 9 yrs.
2/17/66: Vision 20/20 OU; AXT for distance=20 P.D.; for near=0 P.D. Fusion and stereopsis for near; suppresses left eye at 6 meters. Cycloplegic; moderate hypermetropia.
7/30/68: Bilateral 7 mm recession.
8/15/68: AET=10 P.D.; PI 0.06% administered at night for two weeks.
9/5/68: AET=15 P.D.; DFP administered every other night for two weeks.
9/18/68: Fusion, stereopsis for near. AET which was intermittent in character=10 P.D.
11/9/68: Vision: 20/20 OU. Alternate cover, esophoria; fusion with intermittent tropia for near. DFP weekly.
2/22/69: LE(T)^1=10 P.D.; X=0 P.D. Fusion near and far; 80% stereopsis near. Stop DFP.

9. BC, 3 yrs.
9/14/66: Vision: 20/30 OU(?) AXT=25 P.D.; AXT^1=0 P.D. NPC rotations good. Fuses fly test at near.
9/8/67: Bilateral 7.0 mm recess.
9/11/67: Intermittent ET; PI 0.06% h.s.
10/3/67: No ET.
3/14/68: Vision: 20/30 OU. Alternate cover negative for distance and near.

10. DP, 5 years.
7/27/65: LXT=40 P.D. LXT^1=10 P.D. Suppresses left eye at 6 meters. Stereopsis and fusion at 33 cm. Mild hypermetropia.
1/13/66: Bilateral 7.0 mm recess.
1/18/66: LET^1 prefers the right eye. PI 0.06% at night for two weeks.
2/6/66: Alternate cover negative. PI continued on reduced schedule.
9/19/66: Vision: 20/25 OU. Intermittent LET^1=10 P.D. Fusion and stereopsis for near. PI 0.125% twice a week.
1/17/67: Vision: 20/25 OU. Diplopia at 6 meters. Fusion and stereopsis at 33 cm. Alternate cover entirely negative.
8/2/67: Vision: 20/20 in each eye. Alternate cover, XT=0 P.D.; E(T)^1 (?).
10/10/68: Vision: 20/20 in each eye. Maddox rod - S^1=14 P.D. No tropia for near or far.

11. DH, 5 yrs.
10/24/63: Vision: 20/30 in each eye. AXT=30 P.D.; AXT^1=0 P.D. Fusion and stereopsis for near.
11/14/63: Atropine refraction, moderate hypermetropic astigmatism. LXT=30 P.D.; LX(T)^1=20 P.D. Bilateral inferior oblique overaction.
3/5/64: Vision: 20/25 in each eye. Stereopsis. AX(T)=20 P.D.
11/11/64: Vision: 20/20 in each eye. AX(T)=30 P.D., breaks to frank XT easily.
6/10/65: Bilateral 7.0 mm recess.

12. MP, 5 yrs.
1/19/68: Bilateral 7.0 mm recession lateral recti.
1/22/68: Small ET^1. PI 0.06% h.s. nightly.
8/28/68: Vision: 20/20 in each eye. Fusion and stereopsis at 33 cm; fusion at 6 meters.

13. CDM, 5 yrs.
9/19/66: RX(T)=25 P.D.; RX(T)^1=10 P.D. Fusion and stereopsis for near. Atropine refraction, moderate hypermetropia.
1/11/67: Alternate cover AX(T)=35 P.D.
3/22/67: Bilateral 7.0 mm recess.
2/11/68: Vision: 20/25 in each eye. AX(T)^1=0 P.D.; AX(T)=0 P.D. Fuses red-green for distance, and fusion and stereopsis were 37 mm.
8/26/68: Myopic error corrected to 20/20 in each eye. AX(T), for distance=5-10 P.D.

14. BV, 3 yrs.
4/18/67: LXT=35 P.D. LX(T)=30 P.D. Vision (?). Refraction - small amount of myopia on the left.
6/8/67: Bilateral 7 mm recession.
9/28/68: Fuses 4 dot near and far. No stereopsis. Up to 20 P.D. of intermittent LET.

15. EB, 2½ yrs.
5/17/62: LXT=30 P.D. LXT^1=0 P.D.
9/19/62: LXT=20 P.D. LXT^1=0 P.D.
1/12/63: LX(T)=20 P.D.; LX(T)^1=0 P.D. Corrective lenses used. Without corrective lenses: LXT=30 P.D.; LX(T)=20 P.D.
10/19/63: Vision with correction: Right 20/30; Left 20/40. Alternate cover with correction: LXT^1=20 P.D., LX(T)=20 P.D.; without correction: LXT^1=20 P.D., LX(T)=30 P.D.
3/18/65: Vision: 20/30 OU. Fusion 4 dot. Good NPC. Alternate cover, LXT=20 P.D.
9/19/65: Bilateral 7.0 mm recess.
9/23/65: LET. PI 0.06% prescribed.
10/12/65: PI 0.06% continued.
11/19/65: Vision: 20/25 OU. No glasses.
9/12/66: Uncorrected vision: Right 20/20-1; Left 20/30-2. Alternate cover, AET=5 P.D.; AET=5 P.D. Diplopia with 4 dot at 6 meters. Fuses at 33 cm.
12/23/67: LE(T)=(). LET=10 P.D. 15 P.D. PI 0.06% h.s.
1/20/68: Fusion and stereopsis for near and far. PI weekly.
3/30/68: Fusion and stereopsis. Stop PI.
11/16/68: Vision: 20/40 in each eye, 20/30 with both eyes. Alternate cover, negative for near and far. Fuses for near and far.
5/31/69: Corrects to 20/20 (myopic). Alternative cover negative.
16. AT, 6 yrs.
2/7/69: Bilateral 7.0 mm recession.
2/15/69: Alternate cover negative.
2/27/69: Alternate cover negative. Fuses near and far.
5/22/69: X=5 P.D.; X'=0 P.D. Fuses three character test.

Surgical Technique

Under general anesthesia, the patient was prepared with povidone-iodine and, after copious irrigation of the cul de sacs, a child-sized speculum was introduced between the lids of the right eye. A No. 6-0 silk traction suture was inserted at the limbus at 6 and 12 o'clock. The eye was rotated medially. The conjunctiva was grasped immediately anterior to the insertion, and folded to a depth of 3 mm; a single snip with the scissors carried through conjunctiva and subconjunctival tissues, and permitted easy dissection of Tenon's capsule which began just posterior to this plane. The muscle was isolated on a muscle hook after Tenon's capsule was perforated and intermuscular septa were severed. Very little dissection was required since the area of surgery was outside of Tenon's capsule in most instances. A double-armed No. 5-0 plain suture was woven through the muscle and locked at the edges, and the muscle then severed from the globe as flush as possible by angling the scissors to reduce the amount of tissue at the insertion. Bleeding was controlled with mild cautery; a disposable cautery was used. The needles were inserted 7 mm behind the insertion as measured by callipers from the upper and lower borders of insertion. In those patients in whom there was a marked posterior curvature of the insertion at the extreme upper and lower edge of the insertion, the measurement was made from the central portion of the insertion. The knot was tied on the sclera and conjunctiva closed with a running No. 6-0 plain.

A similar procedure was performed for the left eye.

An antibiotic and steroid ointment and patches were applied. The patient's arms were placed in restraints for 24 hours, if necessary, and the next morning the restraints and bandages were removed. The patient was discharged on warm compresses and the antibiotic and steroid ointment four times a day in each eye, and encouraged to carry on all visual activities.

References