Simultaneous Superior Rectus Recession and Anterior Transposition of Inferior Oblique Muscle as a Surgical Option for Traumatically Lost Inferior Rectus Muscle

Anupam Singh, P. K. Pandey, Ajai Agrawal, Kartik Maheshbhai Rana, S. K. Mittal & Barun Kumar

To cite this article: Anupam Singh, P. K. Pandey, Ajai Agrawal, Kartik Maheshbhai Rana, S. K. Mittal & Barun Kumar (2018) Simultaneous Superior Rectus Recession and Anterior Transposition of Inferior Oblique Muscle as a Surgical Option for Traumatically Lost Inferior Rectus Muscle, Strabismus, 26:2, 90-95, DOI: 10.1080/09273972.2018.1444066

To link to this article: https://doi.org/10.1080/09273972.2018.1444066

Published online: 27 Feb 2018.

Submit your article to this journal

Article views: 33

View Crossmark data
Simultaneous Superior Rectus Recession and Anterior Transposition of Inferior Oblique Muscle as a Surgical Option for Traumatically Lost Inferior Rectus Muscle

Anupam Singh, MBBS, MS, P. K. Pandey, MBBS, MD, Ajai Agrawal, MBBS, MS, MAMS, FICS, Kartik Maheshbhai Rana, MBBS, MS, S. K. Mittal, MBBS, MS, and Barun Kumar, MBBS, MD, DM

ABSTRACT

Purpose: To evaluate the role of simultaneous superior rectus (SR) recession and anterior transposition of inferior oblique (ATIO) muscle in patients with traumatically lost inferior rectus (IR) muscle.

Methods: Six patients with history of ocular trauma, followed by sudden onset vertical diplopia along with marked hypertropia (HT) and limitation of depression in abduction in the affected eye suggestive of IR disinsertion, were included in this prospective study. The patients were treated by simultaneous SR recession and ATIO muscle in the affected eye by limbal conjunctival approach under local anesthesia.

Results: Preoperatively, primary position HT of 40–50 (mean 44.16 ± 4.91) prism diopters (PD) was present in all cases which increased to 65–70 (mean 65.83 ± 5.84) PD in down and in the ipsilateral gaze along with marked limitation of depression in abduction and A pattern. On exploration, the IR could not be traced in four cases. Fibrotic muscle sheath with retracted IR was found 10–12 mm away from the limbus in rest of the two patients. ATIO (6.5 mm from the limbus) with simultaneous recession of ipsilateral SR was done under local anesthesia.

At 12 weeks postoperatively, three patients were orthophoric in primary position and vertical alignment with in 4–7 PD in primary position was achieved in rest of the three patients.

Conclusion: Simultaneous SR recession with ATIO seems to be a good alternative to achieve satisfactory vertical alignment for patients with traumatically lost inferior rectus muscle.

Keywords: Anterior transposition of inferior oblique; lost inferior rectus muscle; superior rectus recession

Introduction

Disinsertion of extraocular muscles due to trauma is not a common entity. Out of all extraocular muscles medial rectus and inferior rectus (IR) seem to be most commonly lost after trauma as globe is pushed out and up due to Bell’s phenomena whenever eye is threatened and forced closure follows. IR disinsertion leads to large primary position hypertropia (HT), marked limitation of depression most prominent in abduction, intorsion and exuberant incomitance. Superior rectus contracture further increases the incomitance and adds to surgical woes.

High resolution magnetic resonance imaging may help but such studies can often be inconclusive or misleading, accordingly diagnostic imaging need not be done routinely. The retrievable rate of lost muscles being low, conventional surgical alternatives for IR disinsertion invariably include a large recession of antagonist superior rectus (SR) and part muscle inverse Knapps procedure. Anterior transposition of inferior oblique (ATIO) with resection has also been attempted, however, under-corrections and residual incomitances still occur. Ludwig et al. had good surgical outcome after early repair of flap tear and reinsertion of IR.

Apart from these, other surgical options include contralateral superior oblique recession or Faden operation. In this prospective study, we evaluated the impact of simultaneous ipsilateral SR recession and inferior oblique recession with ATIO on primary position alignment in six patients with traumatically lost IR.

Material and methods

Six patients having history of ocular trauma followed by sudden onset vertical diplopia with marked HT and limitation of depression in abduction in the same eye suggestive of IR disinsertion were included in this prospective study. This study was adhered to declaration of Helsinki.

Five patients were male between age group of 30–45 years and one patient was 38-year-old female.
Three male patients had history of road traffic accidents, two male patients had history of trauma with wooden stick and one female patient had history of attack by bear. Four patients had left-sided involvement and two had right. A complete preoperative ophthalmological examination was performed on each patient including: visual acuity, intraocular pressure, anterior segment, dilated fundus evaluation, cycloplegic refraction, best corrected visual acuity, amount of deviation, ocular motility evaluation, diplopia charting, abnormal head posture and field of single binocular vision.

The prism and alternate cover tests were used to measure the amount of deviation, with the eyes in primary position while fixating with the normal eye at a distance of 6 m. Ocular motility function of each extraocular muscle was clinically evaluated using the standard −4 to +4 grading scale. Subjective torsion was measured by Maddox double rod test. Objective torsion was assessed by indirect ophthalmoscopy and fundus photography.

Forced duction and forced generation test was done under topical anesthesia by the same person in all the patients. As diagnostic imaging can be inconclusive and misleading, these tests did not prove to be essential and clinical signs were considered sufficient for surgical planning.

All patients were operated by limbal conjunctival approach under local anesthesia. ATIO to zero station with simultaneous recession of ipsilateral SR was done under local anesthesia (Table 1).

<table>
<thead>
<tr>
<th>Table 1. Pre and postoperative deviation.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient No.</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>5</td>
</tr>
<tr>
<td>6</td>
</tr>
</tbody>
</table>

Results

Preoperatively primary position HT of 40–50 (mean 44.16 ± 4.91) prism dipters (PD) was present in all cases which increased to 65–70 (mean 65.83 ± 5.84) PD in down and in the ipsilateral gaze was noted with marked limitation of depression in abduction and A pattern (Figures 1, 3 and 5). Patient number six had moderate aponeurotic ptosis of the same side as additional finding. The function of IR muscle revealed a scale of −3 to −4 defect in all patients. Weak muscle force generation in the direction of IR was noted in the affected eye of two patients and it was negative in rest of the four patients. A total of 8–12 degree of subjective intorsion of the affected eye was recorded by double Maddox rods and fundus photography also revealed grade 2–3 intorsion of the same eye in all six patients (Figure 1). Parks 3 step test was inconclusive due to the presence of large HT. On exploration the IR could not be traced (Figure 1) in four cases, while in other two cases fibrotic muscle sheath with retracted IR was found 10–12 mm away from the limbus (Figure 6) ATIO to zero station (6.5 mm from the limbus) with simultaneous recession of ipsilateral SR was done under local anesthesia (Figure 6).

At 12 weeks postoperative visit, three patients were orthophoric in primary position (Figures 2, 3 and 4). Vertical alignment with in 4–7 PD in primary position was achieved in rest of the three patients (Figure 7). These patients had minimal vertical diplopia in primary position and in down gaze. Depression in abduction was much improved (Figures 2, 4 and 7). Elevation was limited in the same eye and diplopia was significant in upgaze but patients were satisfied with the ocular alignment achieved in primary position.

Discussion

Traumatically lost IRs being a rare event, there are only anecdotal reports. IR palsies also suffer the same fate, in a report of 1000 cases of 3rd, 4th and 6th cranial nerve palsies IR palsy did not find mention.8

Von Noorden reported a series of 21 patients of isolated IR palsy, 7 of them were traumatic with 5 having a radiologically confirmed fracture of orbital floor9, none had a lost IR. Ipsilateral recession of SR and resection of IR was the most commonly performed surgical procedure with correction of up to 20 PD of HT in PP.

M. Parvataneni et al.10 reported a series of six patients treated with unilateral anterior transposition of the inferior oblique muscle with resection up to 8 mm for lost IR muscle. They concluded that unilateral anterior transposition of the inferior oblique muscle was an effective procedure in the treatment of a lost
IR muscle and the procedure also provided predictable results when used in the management of patients with coexistent vertical deviations.

M. R. Akbari et al.\textsuperscript{11} reported a case series of 22 patients of unilateral isolated IR palsy, 12 of them were posttraumatic, 9 were congenital and 1 was of ischemic origin. IR disinsertion was not seen in any of the 22 patients. A total of 13 patients (59.1\%) were managed by IR resection alone due to the absence of gross abnormality in IR muscle preoperatively. Partial nature of the paresis leads to good postoperative outcome and only three patients required resurgery. But in cases of IR disinsertion, there are remote chances of retrieval of the disinserted muscle ruling out the surgical option of IR resection. In some patients, fibrotic muscle sheath with or without IR can be retrieved (as in two of our patients) but resection of the fibrosed muscle has remote possibility to achieve primary position alignment.

S. Yang et al.\textsuperscript{12} reported retrospective case series of five patients of absent IR treated with integrated anteriorization of inferior oblique muscle combined with recession of superior rectus. A total of 4 patients achieved orthophoria and 1 had 10 PD of hypotropia.

\begin{figure}
\centering
\includegraphics[width=\textwidth]{figure1}
\caption{(A) Preoperative nine gaze photographs of patient 1. (B) Preoperative fundus photograph showing left grade II intorsion. (C) Per op photograph showing lost IR muscle.}
\end{figure}

\begin{figure}
\centering
\includegraphics[width=\textwidth]{figure2}
\caption{Postoperative nine gaze photograph of patient 1.}
\end{figure}
They concluded that integrated anteriorization of inferior oblique muscle combined with recession of superior rectus was an effective surgical selection to treat HT with absence of IR muscle.

R. Saxena et al.\textsuperscript{13} described a new surgical technique for management of posttraumatic IR disinsertion in which the globe was fixed to the inferior orbital with the help of a silicone band and titanium orbital plate.

In our study, simultaneous SR recession with ATIO to zero station for IR disinsertion achieved orthophoria in three patients (50\%) with residual vertical deviation up to 7 PD in rest of the three (50\%). Upgaze was slightly limited but the patients were satisfied with the surgical outcome.

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{figure3.png}
\caption{Preoperative nine gaze photographs of patient 4.}
\end{figure}

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{figure4.png}
\caption{Postoperative primary position alignment in patient 4.}
\end{figure}

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{figure5.png}
\caption{Preoperative nine gaze photograph of patient 6.}
\end{figure}
Conclusion

Early intervention is most efficacious while dealing with a lost IR as delay may complicate clinical picture due to contracture of superior rectus and lead to scarring and fibrosis at the site of injury. Simultaneous recession of superior rectus with ATIO to zero station seems to be most appropriate in such cases.

References


Figure 6. (A) Per operative photograph of patient 6 showing fibrotic muscle sheath with retracted IR muscle 10 mm away from the limbus. (B) Per operative photograph of ATIO at zero station, 6.5 mm from the limbus.

Figure 7. Postoperative nine gaze photograph of patient 6.