Result of Sternocleidomastoid Release in the Management of Congenital Muscular Torticollis

Pabitra K Sahoo, Mamata M Sahu, Nageswar Ujade, SP Das

ABSTRACT

Background: Congenital muscular torticollis (CMT), primarily a neck deformity resulting from shortening of the sternocleidomastoid muscle that leads the head to turn towards the affected side and the chin points to the opposite side. In developing countries, the parent often neglects and present late, when conservative management has a limited role. Various surgical procedures have been described for the correction of the deformity. The purpose of this study is to find out the result of SCM release followed by definite rehabilitation protocol.

Materials and methods: Twelve cases confirming to inclusion criteria were operated on for congenital muscular torticollis. The affected side, either unipolar or bipolar sternocleidomastoid muscle release was done, depending on preoperative assessment. The sternal head was lengthening by Z-plasty method to maintain the shape of suprasternal notch. Postoperatively all the patients had followed a definite rehabilitation protocol.

Results: Clinical and functional results were assessed using modified Lee’s scoring system and Tanabe’s assessment criteria for torticollis. Results were satisfactory in all the cases except two cases.

Conclusion: The sternocleidomastoid release is an effective technique for the management of congenital muscular torticollis. The procedure is relatively complication free and safe method with predictable outcomes.

Keywords: Rehabilitation, Spinal cord injury, Traumatic.

INTRODUCTION

Congenital muscular torticollis (CMT) is the third most common congenital musculoskeletal anomaly next to developmental dysplasia of hip and club foot. The reported incidence in the literature varies 0.4–1.9%. There are shortening and contracture of sternocleidomastoid muscle resulting from a fibrous sternomastoid pseudotumor. The fibrous pseudotumor disappears by 4–8 months leaving a contracted muscle which fails to grow symmetrically with contralateral muscle. As a result, the head is typically tilted with lateral flexion to the affected side, and chin rotated towards the opposite side in a transverse plane. Children with CMT are associated with plagiocephaly, which may be developmental in nature. As age advances, these findings become more prominent which includes unilateral flattening of occiput with frontal and parietal bossing, cheekbone prominence and anterior ear displacement ipsilateral to flattened occiput. Once this plagiocephaly and hemihypoplasia has occurred, they cannot be corrected after maturity because of loss of potential for growth and remodelling.

The key to successful treatment depends upon the age at which the patient presents to the clinician. For patients presenting before 1 year of age, conservative treatment proves to be good which includes physiotherapy with positioning, manual stretching and strengthening exercises to SCM either by the therapist or by parents. Approximately 50 to 70% of cases of SCM mass with torticollis resolve spontaneously with positioning or therapy in the 1st year of life.

A small portion the children presenting after 1 year age have a definite band of contracted SCM, resistant to therapy and ultimately requiring surgery. Best outcome can be obtained when surgery performed between 1 year and 4 years of age. The surgical treatment methods for CMT have been changed over time and there are still a variety of methods that have shown comparable results. There is also a lack of common consensus regarding the postoperative protocol which includes postoperative positioning with continuous halters traction, maintenance of correction with a different cervical orthosis, stretching and strengthening exercise for operated SCM muscle. However, controversy still exists on the type and duration of bracing, therapeutic methods which some way related to the ultimate outcome of surgery.
AIM

The objective of the study is to find out the result of classical methods of SCM release followed by definite rehabilitation protocol which includes head halters traction in the immediate postoperative period and maintenance of correction with a custom designed cervical orthosis. The results are evaluated in terms of the cosmetic and functional status of the patient and compared with results of other authors.

MATERIALS AND METHODS

The study included 12 patients who had been surgically treated for CMT with the unipolar or bipolar release of SCM from March 2014 to November 2017. The inclusion criteria for case selection include idiopathic congenital muscular torticollis, the absence of any previous surgery and absence of any known pathology that could have been the cause of torticollis (Fig. 1). Age of the patients at surgery varies from 2 to 18 years with a mean age of 7 years 10 months. Out of 12 patients, five were male and seven were female. There was a predominance of right side involvement in seven cases comparison to five cases with left side involvement. Preoperatively radiograph of the cervical spine in all the cases was taken to rule out any associated cervical vertebral anomaly. Five cases had undergone distal unipolar release and bipolar release was done in seven cases. The decision for bipolar or unipolar release had been taken on the operative table. Details of patients’ profile are given in Table 1.

Procedure

Patient under general anesthesia was positioned supine on an operating table, and the involved side was placed under tension by hyperextending the neck and rotating the head towards the shoulder on the unaffected side. A transverse incision of 3 cm length was made over the sternoclavicular joint and laterally by withdrawing the skin upwards. It helped in bringing the scar just below the clavicle and has a cosmetically good appearance. The clavicular head with platysma and deep neck fascia was completely released (Fig. 2). The sternal head was isolated and lengthened by Z-plasty method to maintain the shape of suprasternal notch. The release muscle was stretched adequately by moving the head opposite of deformity. If it was observed that head movements were not of satisfactory range, then proximal release was added with a second incision placed over the site of its mastoid attachment. Muscle attached to the tip of the mastoid process was released with electrocautery. The neck movements were further checked and if required, the muscle was stretched once more. Wound closed after proper hemostasis. Out of 12 patients, 7 cases had undergone bipolar release and unipolar release was done in 5 cases irrespective of age and sex (Graph 1). Postoperatively head halters traction was applied to all the patients with head in a neutral position (Fig. 3) which acted as one form of postoperative immobilization and also helped in relieving pain. The traction was continued until stitch removal after, 2 weeks of surgery. All the patients were fitted with a custom designed torticollis cervical brace (Fig. 4).

Table 1: Patient profile

<table>
<thead>
<tr>
<th>Sl no</th>
<th>Age (years)</th>
<th>Sex</th>
<th>Side</th>
<th>Surgery date</th>
<th>Procedure</th>
<th>Bracing</th>
<th>Follow-up</th>
<th>Lee scoring</th>
<th>Tanabe’s grading</th>
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<tr>
<td>1</td>
<td>5</td>
<td>M</td>
<td>R</td>
<td>18/3/14</td>
<td>Distal</td>
<td>3 Months</td>
<td>46 Months</td>
<td>17</td>
<td>Excellent</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>M</td>
<td>L</td>
<td>23/9/14</td>
<td>Distal</td>
<td>2 Months</td>
<td>40 Months</td>
<td>17</td>
<td>Excellent</td>
</tr>
<tr>
<td>3</td>
<td>15</td>
<td>M</td>
<td>R</td>
<td>8/7/15</td>
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<td>2 Months</td>
<td>30 Months</td>
<td>15</td>
<td>Good</td>
</tr>
<tr>
<td>4</td>
<td>7</td>
<td>F</td>
<td>R</td>
<td>27/7/15</td>
<td>Bipolar</td>
<td>2 Months</td>
<td>30 Months</td>
<td>16</td>
<td>Excellent</td>
</tr>
<tr>
<td>5</td>
<td>4</td>
<td>F</td>
<td>L</td>
<td>2/12/15</td>
<td>Bipolar</td>
<td>2 Months</td>
<td>25 Months</td>
<td>15</td>
<td>Good</td>
</tr>
<tr>
<td>6</td>
<td>7</td>
<td>F</td>
<td>R</td>
<td>7/1/16</td>
<td>Bipolar</td>
<td>2 Months</td>
<td>24 Months</td>
<td>17</td>
<td>Excellent</td>
</tr>
<tr>
<td>7</td>
<td>1</td>
<td>M</td>
<td>L</td>
<td>11/1/16</td>
<td>Distal</td>
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<td>24 Months</td>
<td>17</td>
<td>Excellent</td>
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<tr>
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<td>18</td>
<td>F</td>
<td>R</td>
<td>15/6/16</td>
<td>Bipolar</td>
<td>3 Months</td>
<td>20 Months</td>
<td>16</td>
<td>Excellent</td>
</tr>
<tr>
<td>9</td>
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<td>F</td>
<td>L</td>
<td>29/6/16</td>
<td>Bipolar</td>
<td>2 Months</td>
<td>19 Months</td>
<td>17</td>
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<td>10</td>
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<td>11 Months</td>
<td>14</td>
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<tr>
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<td>2 Months</td>
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<td>13</td>
<td>Fair</td>
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<tr>
<td>12</td>
<td>12</td>
<td>M</td>
<td>R</td>
<td>20/11/17</td>
<td>Bipolar</td>
<td>2 Months</td>
<td>4 Months</td>
<td>17</td>
<td>Excellent</td>
</tr>
</tbody>
</table>

Fig. 1: Left torticollis
for maintenance of correction and were advised to use the brace for three months. All the patients had undergone a course of therapy protocol in the therapy department. The home exercise program was taught to all the patient to continue therapy at home and all were asked to report back if any features of recurrence of deformity detected, at any time.

**Follow-up**

All the patients were evaluated at regular interval with a minimum follow up of 3 months and a maximum of up to 46 months with a mean of 23 months. Patients were evaluated for neck range of motion (ROM), head tilt, craniofacial asymmetry, the presence of lateral band and surgical scar condition at their follow up (Fig. 5).

Postoperatively the results were assessed with a scoring system modified from Lee et al.\(^7\) which includes the function and cosmetic result (Table 2). An excellent result corresponds to 17–18 points, a good result to 15–16 points, a fair result to 13–14 points and a poor result to less than 12 points. The overall functional results of the patients were graded on the assessment criteria described by Tanabe\(^8,9\) (Table 3).

**RESULTS**

It was mandatory for all the patients to undergo for a course of therapy as per the comprehensive designed post operative rehabilitation protocol (Table 4) in the therapy department. Cosmetic improvement in the form of reduction of ‘head tilt and chin deviation’ was noticed in all
patients (Figs 6 and 7). Improvement of functional neck range of movement was observed in all the cases except one because of poor compliance to bracing and therapy. The V-shape of the neck at the sternum was retained in all cases, as we performed a Z-plasty of the sternal end of the SCM muscle. There was no cosmetically unacceptable scar visible at either of the two surgical sites in any of the patients. With respect to modified Lee’s scoring system, six patients (50%) had an excellent result, four patients (33%) had good and two patients (17%) had a fair result (Graph 2). Overall functional result using Tanabe’s assessment criteria (Graph 3) is shown in Table 1. Despite the bipolar release, only one case had a fair result because of poor compliance to postoperative rehabilitation protocol.

DISCUSSION
Most of the CMT resolve completely, either spontaneously within months after birth or following the early initia-
tion of conservative measures such as gentle controlled manual stretching exercise to affected sternocleidomastoid.\textsuperscript{1,5} Sonmez et al. in their study observed that 95% of CMT treated effectively before 1 year age did not need surgical management.\textsuperscript{10} Nonoperative therapy after the age of 1 year is rarely successful.\textsuperscript{11} The goal of surgical correction for older children is an improvement in cosmetic deformity and cervical motion.\textsuperscript{12} There has been a considerable debate over the effectiveness and necessity of invasive surgical release of sternocleidomastoid in patients with neglected CMT, aged 5 years and above.\textsuperscript{13,14} According to previous studies, surgical correction in adults with neglected CMT may result in cosmetic and functional improvement and relieve pain related to neglected CMT.\textsuperscript{15} The effectiveness of surgical release was significant even in patients with neglected CMT aged 15 or older.\textsuperscript{16} Our study also has a similar result. The eldest among our study group also of 18 years age has shown an excellent result, whereas the child of 7 years age has a fair correction only. Hence age may not be taken as the only limiting criteria for effective surgical correction of CMT.

Surgical correction of CMT by the release of sternoclavicular end only (unipolar) or along with release proximal attachment (bipolar) is an issue for debate. Kubo et al.,\textsuperscript{9,17} in their series, had a good outcome in more than 80% of patients managed by unipolar tenotomy and postoperative therapy with immobilization in the corrected position on a magic bed, an upper body immobilization device until the pain resolved followed by active functional exercise. Kamegaya,\textsuperscript{18} conducted unipolar tenotomy for management of CMT followed by postoperative therapy where they used their original brace and stretching exercise. They emphasized the importance of postoperative therapy for surgical outcomes. However, the study conducted by Jong et al.\textsuperscript{19} had shown less improvement in head tilt in patients managed with unipolar tenotomy. Lee et al.\textsuperscript{20} had found a recurrence rate of 7% in their series of unipolar release. Chin-En et al.\textsuperscript{21} had shown better outcome with bipolar tenotomy followed by postoperative stretching exercises and maintenance of correction with a cervical collar. Huseyin et al.\textsuperscript{22} emphasized on postoperative horizontal traction for a minimum of 5–7 days in their patients underwent bipolar tenotomy and reported that 70% of the patients had positive outcomes without recurrence. Excellent result in 90% of cases was documented. by conducting bipolar tenotomy followed by immobilization with a cast in corrected position for about 3 weeks. Panigrahi et al.\textsuperscript{23} had also shown good result in their bipolar release series with strict adherence to a postoperative therapeutic protocol.

Postoperative rehabilitation appears to have some key role in all the studies discussed above.

The treatment policy for our study group had no fixed criteria whether to go for unipolar or bipolar with respect to age of the patient or severity of the deformity. The decision of bipolar release was taken when adequate head rotation and lateral flexion was not achieved even after distal release along with sufficient stretching of the released muscle. Overall results are uniform among the unipolar and bipolar release group of the current series. Z lengthening was done in all our cases to preserve the neckline. So far there is no existing guideline to estimate the extent of lengthening of SCM by Z-plasty.\textsuperscript{20} Based on the discussion above, postoperative therapy and brace for maintenance of correction have a significant role. The released tissue regenerates actively and fibrous continuum may be formed early after tenotomy, it is important to maintain the corrected position for a certain period after tenotomy, that allows an extension of the tendon of the released part. Thus elongation, rather than the surgical release of the tendon should be emphasized, and that can be achieved by adhering to strict postoperative rehabilitation protocol.
CONCLUSION

The sternocleidomastoid release is an effective technique for the management of congenital muscular torticollis in that it not only improves neck range of motion and pain; also there is a cosmetic and functional improvement. The procedure is relatively complication free and safe method when compared to other methods like total resection of the sternocleidomastoid muscle, arthroscopic release method. For better cosmesis, lengthening of the sternal head by Z-plasty restores the V-shape of the base of the neck. However, equal importance should be given to postoperative rehabilitation with strict adherence to institutionally based therapy and use of a specially designed custom-made cervical orthosis. The procedure is easy to learn and has a predictable outcome.

REFERENCES