Section: Orthopaedics

Original Research Article

MEAR`S PROCEDURE FOR SPRENGEL SHOULDER: FUNCTIONAL AND RADIOLOGICAL OUTCOME

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Abstract

Background: Sprengel's shoulder is characterized by scapular maldescent and malposition, causing restriction of shoulder and cervical spine movements. Various surgical procedures have been described to treat this anomaly with no consensus as to the surgical procedure of choice. We report the results of the Mears procedure in the treatment of Sprengel's shoulder. **Materials and Methods:** 22 children were treated for Sprengel's deformity with follow up of 2- 11 years (2012-2024), with omovertebral bar, and other congenital anomalies. The Cavendish score and Rigault score were used to assess the severity of the deformity. The Mears procedure involved scapular osteotomy, partial scapular excision, and release of a long head of triceps. The patients were followed at six weeks, three months and regularly at six-months interval. **Result:** The mean improvement in flexion and abduction was 68 ° (40 - 70 °) ($P < 0.001$) and 62 ° (40 - 70 °) ($P < 0.001$) when compared to pre operative movement, respectively, which was the combined glenohumeral and thoracoscapular movement, mean cavendish grade ($P < 0.001$) is 2 and Rigault grade 2 ($P < 0.001$). The cosmetic and functional improvement by this procedure was acceptable to the patients. Minor scar hypertrophy was seen in two cases. **Conclusion:** The Mears procedure gives excellent cosmetic and functional results. This procedure addresses the functional aspect of the deformity and is much more acceptable to the patient.

INTRODUCTION

Sprengel's deformity is characterized by a high-riding scapula, asymmetry in the shoulder contour and restriction of shoulder movement. Several treatment options and techniques were described in literature that mainly focussed on positioning the scapula at its normal anatomical location. These had a limited success rate as Sprengel's shoulder was a complex deformity and not merely an undescended scapula. In fact, with those methods, recurrence of deformity, loss of function, and neurological problems were seen. In 2001, Dana Mears described a new surgical technique, which involved scapular osteotomy, partial excision of the scapula, and release of the long head of triceps, to improve the function of the shoulder. There is a paucity of information regarding the role of the Mears procedure in Sprengel's deformity. To date only two series have been published in English literature using the Mears technique, of which one is by the original author. We report our experience with this technique in a small series of 16 cases.

MATERIALS AND METHODS

22 children with Sprengel's deformity operated between 2012 and 2024 were reviewed retrospectively in our institution. In our study, there were 14 females and 8males, in the age group of three to ten years. The right side was involved in four cases ,left side was involved in 17 cases and one bilateral case. Preoperatively, all the cases were assessed clinically and radiologically. MRI spine was taken in all cases to rule out spinal anomalies and to se omovertebral mass. The omovertebral bar was present in 2 cases. The Cavendish grade was used to assess the severity of the clinical deformity and the Rigault radiological classification was used to assess the position of the scapula, relative to the cervical spine. All the children underwent the Mears procedure under general anesthesia, with the patient in a prone position. The high riding scapula was exposed by transverse incision over the spine of scapula. The omovertebral bar was excised extra periosteal. Oblique osteotomy through the body, along with sufficient resection of the scapula was done to avoid impingement. The longhead of the triceps was released. Postoperatively, the patient was immobilized in a shoulder sling and range of motion exercises were started. The patients were reviewed at

six weeks, three months, and then regularly at six-month intervals.

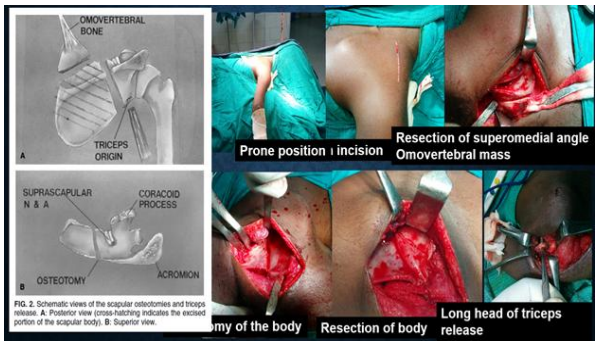

Figure 1: Surgical steps of MEARS Procedure

RESULT

The mean follow-up was 7 years (1-11 years). On the affected side, preoperatively, the average flexion at the shoulder was 75 degrees (50 – 100) and the mean abduction atthe shoulder was 85degrees (70 – 100). The mean improvement in the flexion was 62degrees (40 – 70) and the mean improvement of abduction was 60degrees (40 – 70). Post-operative mean Cavendish grade ($P < 0.001$) is 2 and Rigault grade 2 ($P < 0.001$).

Minor scar hypertrophy was seen in two cases. The postoperative radiograph done at 3 months showed reformation of the scapula. The scapular size, however, remained small as compared to the contralateral normal side. Clinically, all the children had muscle power comparable to the opposite side.

Table 1

S.n	Cavendish grade		Rigault grade	
	Pre op	Post op	Pre op	Post op
1	3	2	2	2
2	3	2	3	2
3	2	2	3	2
4	3	1	2	1
5	2	1	3	2
6	3	1	2	2
7	3	1	2	2
8	2	1	2	1
9	3	2	3	2
10	2	1	2	2
11	3	2	3	2
12	3	2	2	1
13	4	3	3	2
14	4	2	4	2
15	2	1	3	2
16	2	1	2	1
17	2	2	3	2
18	2	1	2	2
19	4	2	2	2
20	3	2	2	1
21	3	2	3	2
22	3	2	4	2

Figure 2

DISCUSSION

The different treatment modalities and surgical techniques described in literature have been as varied and complex as the deformity itself. Woodward's procedure has been considered the gold standard and the reference procedure, with over 80% satisfactory functional and cosmetic results. Younger patients obtain better motion andpostoperative correction. In the original Green's procedure(Scapulopexy), muscle resection is done distally, rather than proximally. The muscles are reattached higher than the acromiothoracic junction's rotation center. This procedure supposedly allows both lowering and rotation of thescapula, which provides a better biomechanical effect. Both needs extensive dissection and the procedure was technically demanding. Hypertropic scar & Transient brachial plexus palsy observed in most of the series.so not indicated in older children.

Recent reports have highlighted good results with the MearsTechnique. In the original procedure flexion improved from 100° to 175° and abduction improved from 90° to 150. In another study by Dr. Javier et al., 14 patients with Sprengel shoulder were managed by the Mears procedure. In these patients, both flexion and abduction improved by more than 60°, with significant improvement in the range of motion. Our results are comparable to the already published series. The mean improvement in the flexion was 62

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degrees and the mean improvement of abduction was 60degrees.

Minor scar hypertrophy was seen in two cases. All children improved cosmetically and functionally. No neurological deficit in any of our cases.

CONCLUSION

Mears technique gives both cosmetic and functional improvement. This procedure Can be used to treat older children without the risk of brachial plexus injury.

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