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A modified Mason-Allen technique for mini open transosseous rotator cuff repair

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Abstract

Objectives: The modified Mason-Allen suture technique has a strong tissue holding property as it creates a rip stop which prevents tendon pull-out. As our most of patients come from lower socio economic strata, we use Ethibond suture with modified Mason Allen technique to repair medium size rotator cuff tear. The objective of our study is to evaluate clinical outcomes of modified Mason-Allen technique for mini open rotator cuff repair using Ethibond nonabsorbable suture.

Methods: This is case series in which we prospectively studied 23 patients of rotator cuff tear who treated with modified Mason-Allen suture technique using Ethibond suture and mini open approach in between June 2015 to August 2017. All patients were evaluated using Constant score at 6, 12 months.

Results: The preoperative mean Constant score was 54. The mean Constant score at six months was 78. Two patients were lost to follow-up after 8 months. After 12 months, mean Constant score improved to 90. We experienced re-tear in one patient and post operative superficial infection in one patient.

Conclusions: A modified Mason-Allen technique with nonabsorbable suture is good alternate treatment method for medium size rotator cuff tear and it's also very cost effective.

Keywords: Rotator cuff tear, shoulder, modified mason Allen suture, transosseous

1. Introduction

Despite of advantages like less post-operative pain, low deltoid morbidity and faster rehabilitation ^[1, 2, 3, 4], Arthroscopic rotator cuff repair have some minor disadvantages. Shoulder arthroscopic procedures are technically demanding ^[5], very costly and unaffordable to common man in our state as these procedures are not funded by government. There was no significance difference in postoperative pain and clinical outcomes between minimal open and arthroscopic rotator cuff repair ^[6-9]. There is a Controversy between suture anchors and transosseous tunnel technique. But contact between tendon and footprint area is improved in transosseous repair technique as compared to suture anchor techniques ^[10, 11]. Weak link in tendon-bone unit is at the suture-tendon interface. That's why Suture technique for tendon grasping should have high fixation strength and mechanical stability ^[11]. Modified Mason-Allen suturing technique which was first proposed by Gerber *et al.* ^[13], is biomechanically stronger than the traditional single and mattress sutures ^[12, 14]. The objective of our study is to evaluate clinical outcomes of modified Mason-Allen suture technique for mini open transosseous rotator cuff repair using Ethibond nonabsorbable suture.

2. Methods and Material

This is case series in which we prospectively studied 23 patients of rotator cuff tear who treated with modified Mason-Allen suture technique using Ethibond suture and mini open approach in between June 2015 to August 2017.

Inclusion criteria was patients with full thickness medium ^[15] (1-3cm) rotator cuff tear. Exclusion criteria were 1. Goutallier ^[16] Grade 3 and 4 cuff 2. partial rotator cuff tear 3. Large and massive ^[15] rotator cuff tears 4. Rotator cuff tears associated with shoulder arthritis or instability.

All patients were evaluated using Constant score at 6, 12 months and VAS score in postoperative period.

2.1 Surgical technique

All procedures were carried out by the first author. All the patients underwent arthroscopy in the lateral position.

Arthroscopic Evaluation- Standard arthroscopic portals were used. Diagnostic arthroscopy was done. After identification of cuff tear, determination of type & size of tear was done. Frayed and torn edges of cuff tear were converted into smooth. Subacromial decompression and acromioplasty were performed if necessary.

Mini open technique- Lateral vertical incision was made by extending the pre-existing lateral portal. Deltoid muscle was split between the anterior and middle muscle belly. Foot print area was prepared. Transosseous holes were made in the footprint. Modified Mason- Allen suture was taken in tendon using Ethibond. (Fig 1) Threads were passed through transosseous holes using needle. Knot was tied after complete mobilization of tendon to footprint.

2.2 Post-operative Rehabilitation

Patients are placed in a sling for approximately 15 days postoperatively. In first week, only gentle passive motion was given. Formal physical therapy began at the second to third week including closed kinetic chain exercises, scapula stabilizing exercises. Active motion was started after 10 weeks. Vigorous shoulder activities were given after 5-6 months.

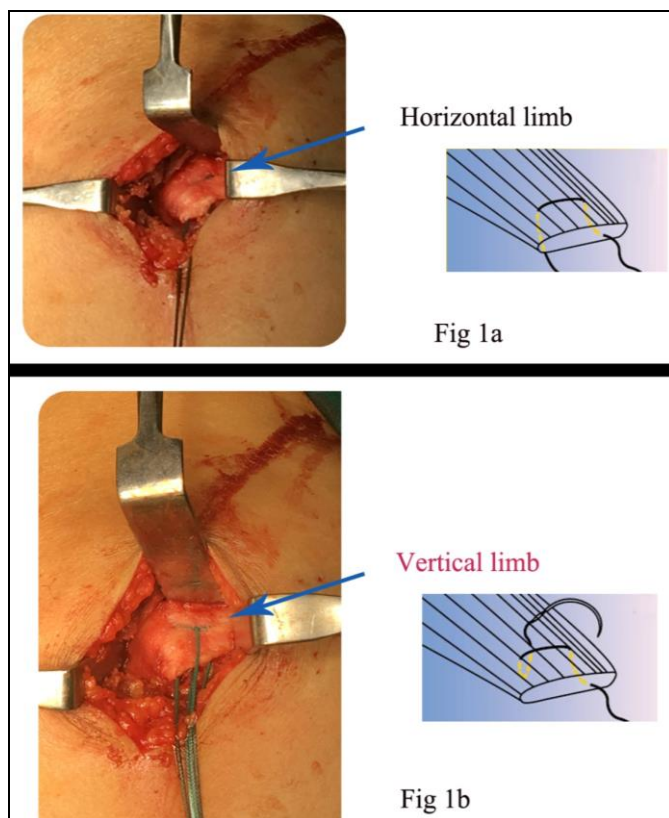


Fig 1: Modified Mason Allen suture technique 1a. Horizontal limb
1b. Vertical limb

3. Results

The average age of the 23 patients included in the study at the time of the surgery was 36.4 years (range 27–53 years). The mean width of the cuff tear was 1.96 cm(1-3 cm). The preoperative mean Constant score was 54. The mean Constant score at six months was 78. Two patients were lost to follow-up after 8 months. After 12 months, mean Constant score improved to 90. VAS score increased till post of day 3 then it was decreased rapidly after 1 week. We experienced

complications in 2 patients; re-tear in one patient after 8 weeks and superficial post operative infection in one patient.

4. Discussion

Outcome of rotator cuff repair depends upon size of the tear, fatty muscle infiltration [16, 17]. But failure of small to medium cuff tear repair with minimal fatty infiltration occurs mainly due to inadequate fixation of the tendon or failure of the suture or the knot [13, 18]. However, the main reason of lack of success is the suture pullout through the tendon [13]. The suture technique should have qualities like high initial fixation strength, excellent mechanical stability, minimal strangulation of the tendon for grasping the retracted tendon [12].

Gerber *et al.* [13] proposed that modified Mason-Allen suture technique is biomechanically stronger than single and mattress sutures for open rotator cuff repair. The modified Mason-Allen suture technique possesses several advantages like strong tissue holding property, less strangulation of the rotator cuff tendon [14]. Schlegel TF *et al.* [19] compared two suture techniques; inclined horizontal mattress suture pattern placed with special arthroscopic instrumentation (HMS) and the modified Mason-Allen pattern (MMA). They found no statistically significant difference between two techniques in load-to-failure and stiffness in sheep model. Klinger *et al.* [18] (2007) conclude that arthroscopic Mason-Allen stitches using bioabsorbable suture anchors provides superior strength than the modified Mason-Allen transosseous suture technique with Ethibond in sheep infraspinatus tendons.

In our study of 23 medium cuff tears, mean Constant score was 90 after 12 months of follow up. In the study of Boehm TD *et al.* [17], mean Constant score was 91 in one group of 49 patients who had transosseous repair with No. 3 Ethibond using modified Mason-Allen sutures. Thirty-one patients, who underwent arthroscopic transosseous rotator cuff repair with braided nonabsorbable sutures, were studied by Black *et al* [20]. The average ASES score was 86.3 of 100 in their study. In the study by Voigt *et al* (2010) [21], The Constant score for transosseous- equivalent repair increased from preoperative 64%, to 82% at 4 months and 96% at 12 months for transosseous- equivalent cuff repair.

In our study, complications occurred in two patients. Re-tear happened in one patient after 8 weeks (rate- 4.35%). We lost follow up of that patient after complication. One patient suffered superficial incision site infection which was cured by regular dressing and oral antibiotics. In the group of had transosseous repair with Ethibond using modified Mason-Allen sutures, Boehm TD *et al* observed rate of further tear was 18% in 49 patients.

Limitations of our study were: 1. Small sample size 2. No biomechanical or radiological criteria were used for outcome 3. It was observational study.

5. Conclusion

A modified Mason-Allen technique with nonabsorbable suture is good alternate treatment method for moderate rotator cuff repair and it's also very cost effective.

5.1 Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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