

## Technical Note

# The Mason-Loop for Single-Row Full-Thickness Rotator Cuff Repair

Elio Disegni, M.D., Victor Housset, M.D., and Geoffroy Nourissat, M.D., Ph.D.

**Abstract:** Rotator cuff injuries are common and can lead to pain and functional limitation of the shoulder, sometimes requiring surgical procedure. We present here a new surgical approach combining the modified Mason-Allen and lasso-loop techniques for the repair of rotator cuff injuries. This hybrid approach brings the 2 advantages of each suture: the compression provided by the loop and the large quantity of tendons caught by the Mason-Allen in a single repair row.

Rotator cuff injuries are common in the general population and can lead to pain and significant functional limitation of the shoulder.<sup>1</sup> There are a number of possible treatments in this nosological context, ranging from rehabilitation alone to surgery.<sup>2-4</sup> Arthroscopy may be necessary in the management of these lesions, in order to relieve the patient's discomfort<sup>5</sup> and to allow tendon healing.<sup>6</sup> A number of techniques have been described for arthroscopic repair,<sup>7-13</sup> including anchor reinsertion and edge-to-edge repair. In addition to the various types of suture, some surgeons use single- or double-row techniques, with no proven superiority.

The modified Mason-Allen is an anchor reinsertion technique that combines a single center stitch with a horizontal mattress knot.<sup>12</sup> The modified Mason-Allen is known for its robustness and ability to maintain constant tension on the suture.<sup>14,15</sup> The lasso-loop, described by Lafosse et al.,<sup>11</sup> also corresponds to an anchor reinsertion technique in which one of the threads is passed through the edge of the lesion without being pulled through completely. A loop is then created with the thread at the top of the tendon, and the same thread is passed through the loop. The lasso-loop allows the tissue to be fixed or repaired.

We have therefore combined these 2 techniques to propose an innovative approach to arthroscopic single-row repair of rotator cuff injuries. The main advantages and disadvantages of the modified Mason-loop knot are given in [Table 1](#).

## Surgical Technique

### Clinical Diagnosis and Imaging

Diagnosis of a rotator cuff tear requires a full clinical examination, combined with imaging studies (ultrasound, arthro-computed tomography, magnetic resonance imaging/arthro-magnetic resonance imaging). If pain or loss of function is present, and there are no clinical or radiologic contraindications, the patient is offered arthroscopic repair.

### Patient Positioning

The patient is under general anesthesia combined with locoregional anesthesia using an ultrasound-guided interscalene block.

For arthroscopic rotator cuff repairs, we place our patient in the supine position.<sup>16</sup> An articulated arm is used for traction of the limb to unclip the scapulohumeral joint, as well as for mobilization of the upper limb.

**Table 1.** Advantages and Disadvantages of the Mason-Loop for Arthroscopic Cuff Repair

Advantages	Disadvantages
Stiffness of the suture	More challenging technically
Only 1 anchor required	Procedure takes longer
Reduces the risk of cutting through sensitive tissue	Multiple types of forceps needed
Better force of traction	

From Ramsay Général de Santé, Cliques des Maussins, Paris, France.

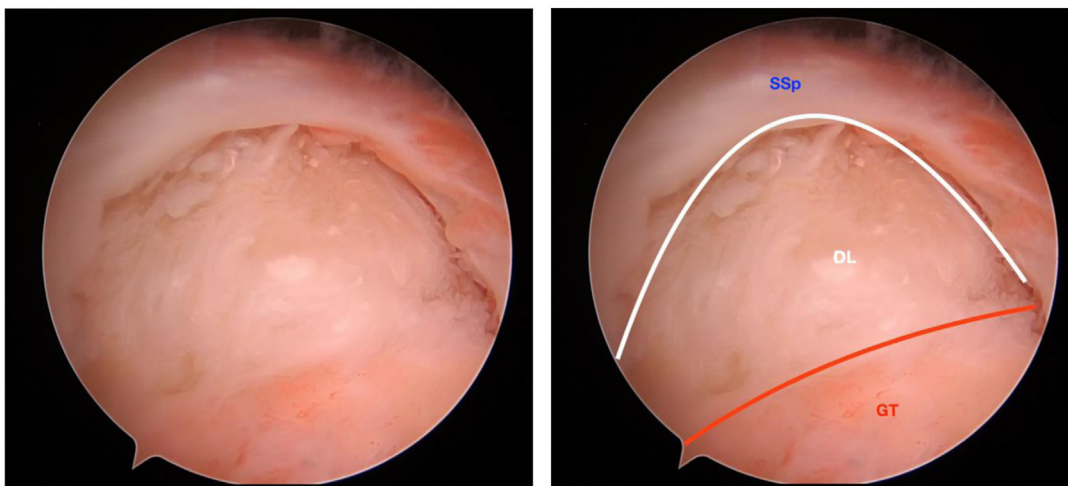
Received March 27, 2024; accepted May 25, 2024.

Address correspondence to Elio Disegni, M.D., 7 allée Georges Pompidou, 94300 Vincennes, France. E-mail: [docteur.disegni@gmail.com](mailto:docteur.disegni@gmail.com)

© 2024 THE AUTHORS. Published by Elsevier Inc. on behalf of the Arthroscopy Association of North America. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

2212-6287/24518

<https://doi.org/10.1016/j.eats.2024.103145>



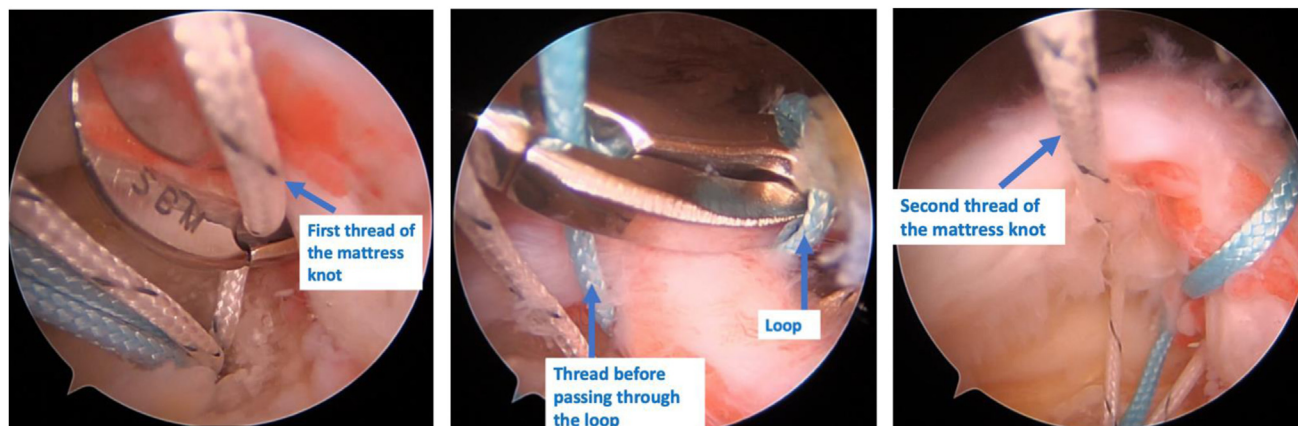
**Fig 1.** Arthroscopic view through the lateral portal (right side, supine position) of the rotator cuff tear: tear of the supraspinatus (SSp) with the deeper layer of the supraspinatus still attached (DL) and the footprint greater tuberosity (GT).

### Surgical Procedure

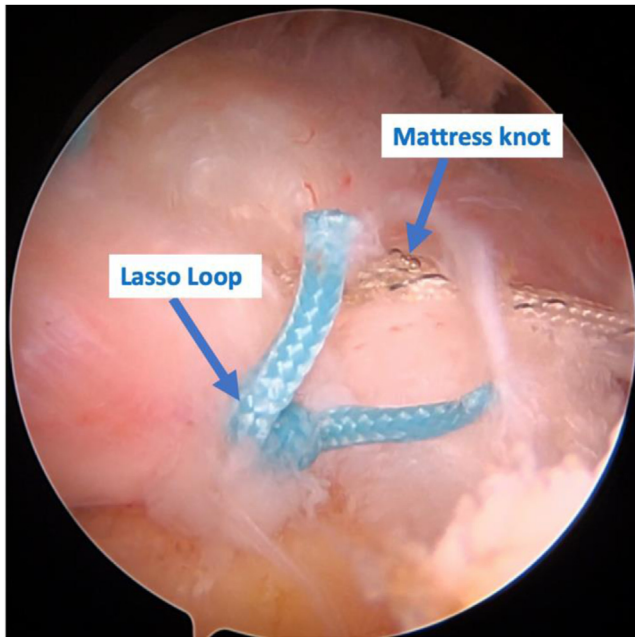
The surgical procedure is shown in [Video 1](#). For rotator cuff repair, we use a lateral optical approach to reach the subacromial space and gain direct access to the cuff lesion. An anterior instrumental approach is used. We observe the lesion at the distal insertion of the supraspinatus ([Fig 1](#)). The bursa is removed and the coracoacromial ligament is cut with bipolar electrodes, also used to prepare the major tubercle flush with the cartilage, at the location of the footprint where the anchors will be implanted. Still using a lateral approach, we perform an intra-articular assessment by passing the optic directly through the cuff lesion. An acromioplasty is then performed using a shaver knife. A third anterolateral arthroscopic portal is then used, through which 2 double-loaded thread anchors (FIXIT 4.5 mm; SBM) are

screwed, with a 5-mm separation between the 2 anchors. In the first stage, a suture-passing device (cleaver type; SBM) is passed through the anterior part of the supraspinatus from superficial to deep, and one of the white threads is recovered and then extracted extra-articularly ([Fig 2](#)). The same device is used to retrieve a blue thread from the same anchor and perform a lasso-loop: a loop is then created with the thread at the upper part of the tendon, and the same thread is passed through the loop. The same maneuver is performed with the threads of the other anchor at the posterior part of the lesion, but the blue threads are used for the Mason-Allen and the white thread for the lasso-loop, so they are not confused with the first anchor.

Each knot is then tightened, starting anteriorly with the lasso-loop ([Fig 3](#)), then the Mason-Allen, then



**Fig 2.** Arthroscopic view through the lateral portal of the Mason-loop: on the left, the first thread of the mattress knot is being passed through the supraspinatus with the specific forceps. In the middle, the forceps pass through the loop made with the second thread to catch it, with a view of doing the lasso-loop. On the right, the second part of the first thread is passed through the supraspinatus to finish the mattress knot.



**Fig 3.** Arthroscopic view through lateral portal (right side, supine position): visualization of the results after the first anterior Mason-loop. First the loop is tightened before the horizontal mattress.

posteriorly in the same order (Fig 4). The pearls and pitfalls for a stepwise approach to the surgical technique of the modified Mason-loop knot for a rotator cuff repair are given in Table 2.

### Rehabilitation

Postoperatively, the patient is immobilized in an abduction brace for 3 days, which can then be removed at home to enable the limb to be used for daily activities that do not require strength training. Passive physiotherapy is started immediately and active physiotherapy after 6 weeks. Patients are monitored at 3 weeks for a clinical evaluation and then at 3 months for a clinical and ultrasound control.

### Discussion

The modified Mason-Allen has been shown to be effective in tendon repair.<sup>17,18</sup> Castillo et al.<sup>17</sup> demonstrated the stiffness of Mason-Allen and its superiority to other types of sutures in an ex vivo study of muscle laceration repair. In another ex vivo study, Liu et al.<sup>18</sup> measured a force of over 1,300 N to observe iterative rupture of the infraspinatus after suturing with a modified Mason-Allen.

Therefore, we sought to further improve the tensile strength of the modified Mason-Allen, by replacing the single suture with a lasso-loop. In biomechanical evaluation by Ponce et al.,<sup>19</sup> we can see that the lasso-loop has a higher resistance than the single suture.

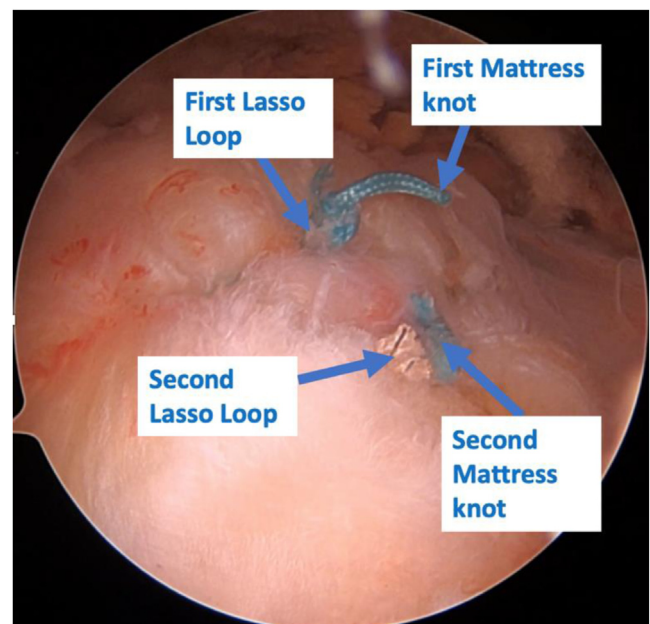
This type of suture has initially been developed to improve tissue fixation in both rotator cuff tears and biceps tenodesis.<sup>11</sup> The effectiveness of these 2 types of suture has led to their use in a wide variety of anatomic areas and pathologies, from rotator cuff repair in the shoulder to repair of Bankart lesions,<sup>20</sup> to meniscal repair in the knee.<sup>21,22</sup>

Therefore, we have described here the association of 2 interesting and mechanically effective techniques, but further clinical and biomechanical studies are needed to demonstrate the clinical superiority of our Mason-loop compared with other sutures.

The combination of Mason-Allen and lasso-loop offers several advantages for the repair of rotator cuff injuries in shoulder arthroscopy. This hybrid technique allows for good compression of the tendon on the bone while maintaining constant tension on the suture to ensure a strong and durable repair. The simplicity of the procedure makes it accessible to a wide range of orthopaedic surgeons.

### Disclosures

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests: G.N. states that he is an occasional education and research consultant for SBM. All other authors (E.D., V.H.) declare that they have no known competing financial interests or personal



**Fig 4.** Arthroscopic view through lateral portal (right side, supine position): visualization of the reparation of the cuff tear after the second Mason-loop. The cuff is fixed again to the footprint.

**Table 2.** Pearls and Pitfalls of the Mason-Loop for Arthroscopic Cuff Repair

Pearls	Pitfalls
Leave 5 mm between the 2 threads for the horizontal mattress knot Tighten the loop before the horizontal mattress	Thread entanglement if not unraveled before tightening Failure to select the correct portal may result in incorrect traction and a more difficult procedure
If more than 1 anchor is needed, tighten the knot from the most anterior anchor first	Cannot be performed with the use of easily penetrating graspers
Make the loop and pass the same thread through it	

relationships that could have appeared to influence the work reported in this paper.

## References

- Tashjian RZ. Epidemiology, natural history, and indications for treatment of rotator cuff tears. *Clin Sports Med* 2012;31: 589-604. <https://doi.org/10.1016/j.csm.2012.07.001>.
- Ryösä A, Laimi K, Äärimala V, Lehtimäki K, Kukkonen J, Saltychev M. Surgery or conservative treatment for rotator cuff tear: A meta-analysis. *Disabil Rehabil* 2017;39: 1357-1363. <https://doi.org/10.1080/09638288.2016.1198431>.
- Prabhakar A, Kanthalu Subramanian JN, Swathikaa P, Kumareswaran SI, Subramanian KN. Current concepts on management of cuff tear. *J Clin Orthop Trauma* 2022;28: 101808. <https://doi.org/10.1016/j.jcot.2022.101808>.
- Atoun E, Oulianski M, Bachar-Avnieli I, et al. Sub-acromial balloon spacer for irreparable rotator cuff tear treatment shows improved pain and strength at 5-year follow-up. *Arthroscopy* 2024;40:543-550. <https://doi.org/10.1016/j.arthro.2023.07.058>.
- Flurin PH, Hardy P, Abadie P, et al. Arthroscopic repair of the rotator cuff: Prospective study of tendon healing after 70 years of age in 145 patients. *Orthop Traumatol Surg Res* 2013;99:S379-S384 (suppl). <https://doi.org/10.1016/j.otsr.2013.10.007>.
- Kwon J, Kim SH, Lee YH, Kim TI, Oh JH. The Rotator Cuff Healing Index: A new scoring system to predict rotator cuff healing after surgical repair. *Am J Sports Med* 2019;47: 173-180. <https://doi.org/10.1177/0363546518810763>.
- Sileo MJ, Ruotolo CR, Nelson CO, Serra-Hsu F, Panchal AP. A biomechanical comparison of the modified Mason-Allen stitch and massive cuff stitch in vitro. *Arthroscopy* 2007;23:235-240, 240.e1-2. <https://doi.org/10.1016/j.arthro.2006.11.007>.
- Aramberri-Gutiérrez M, Tiso-D'Orazio G, Gómez-Garrido D, Antequera-Cano JM, Murillo-González JA, Mediavilla-Arza I. A lasso-loop traction technique for arthroscopic superior capsular reconstruction. *Arthrosc Tech* 2020;9:e1423-e1428. <https://doi.org/10.1016/j.eats.2020.06.002>.
- Toussaint B, Schnaser E, Lafosse L, Bahurel J, Gobezie R. A new approach to improving the tissue grip of the medial-row repair in the suture-bridge technique: The “modified lasso-loop stitch.”. *Arthroscopy* 2009;25: 691-695. <https://doi.org/10.1016/j.arthro.2008.11.002>.
- Castagna A, Conti M, Mouhsine E, Delle Rose G, Massazza G, Garofalo R. A new technique to improve tissue grip and contact force in arthroscopic capsulolabral repair: The MIBA stitch. *Knee Surg Sports Traumatol Arthrosc* 2008;16:415-419. <https://doi.org/10.1007/s00167-007-0450-5>.
- Lafosse L, Raebroeckx AV, Brzoska R. A new technique to improve tissue grip: “The lasso-loop stitch.”. *Arthroscopy* 2006;22:1246.e1-e3. <https://doi.org/10.1016/j.arthro.2006.05.021>.
- Schneeberger AG, Beck M, Gerber C. In-vitro stability of rotator cuff repair techniques. *Orthopade* 1995;24:268-274 [in German].
- Orozco E, Dhillon J, Keeter C, Brown TD, Kraeutler MJ. Rotator cuff repair with patch augmentation is associated with lower retear rates for large tears: A systematic review of randomized controlled trials. *Arthroscopy* 2024;40: 1300-1308. <https://doi.org/10.1016/j.arthro.2023.08.072>.
- Hawi N, Dratzidis A, Kraemer M, et al. Biomechanical evaluation of the simple cinch stitch for arthroscopic rotator cuff repair. *Clin Biomech (Bristol, Avon)* 2016;36:21-25. <https://doi.org/10.1016/j.clinbiomech.2016.04.018>.
- Itoigawa Y, Uehara H, Tsurukami H, et al. The combined suture bridge with Mason-Allen technique is superior to the conventional suture bridge technique for arthroscopic rotator cuff repair. *Arthroscopy* 2024;40:674-680. <https://doi.org/10.1016/j.arthro.2023.07.009>.
- Houssset V, Payan C, Nourissat G. Arthroscopic rotator cuff repair in supine position. *Arthrosc Tech* 2021;10: e1131-e1135. <https://doi.org/10.1016/j.eats.2021.01.004>.
- Castillo AC, Kaltwasser K, Morris R, et al. Comparing 3 suture techniques after muscle laceration repair. *Hand (N Y)* 2021;16:67-72. <https://doi.org/10.1177/1558944719837021>.
- Liu Q, Qi J, Zhu W, et al. The effect of pulling angle on rotator cuff mechanical properties in a canine in vitro model. *Bioengineering (Basel)* 2023;10:599. <https://doi.org/10.3390/bioengineering10050599>.
- Ponce BA, Hosemann CD, Raghava P, Tate JP, Eberhardt AW, Lafosse L. Biomechanical evaluation of 3 arthroscopic self-cinching stitches for shoulder arthroscopy: The lasso-loop, lasso-mattress, and double-cinch stitches. *Am J Sports Med* 2011;39:188-194. <https://doi.org/10.1177/0363546510383394>.

20. Housset V, Nourissat G. Modified Mason-Allen knot for arthroscopic complex Bankart lesion repair in recurrent anterior shoulder instability. *Arthrosc Tech* 2021;10:e1909-e1914. <https://doi.org/10.1016/j.eats.2021.04.018>.
21. Milenin O. Margin convergence continuous lasso-loop overlocking technique for the repair of horizontal and longitudinal knee meniscal tears. *Arthrosc Tech* 2022;11:e1721-e1727. <https://doi.org/10.1016/j.eats.2022.06.007>.
22. Silberberg Muiño JM, Nilo Fulvi A, Gimenez M, Muina Rullan JR. Outside-in single-lasso loop technique for meniscal repair: Fast, economic, and reproducible. *Arthrosc Tech* 2018;7:e1191-e1196. <https://doi.org/10.1016/j.eats.2018.08.001>.