

A Comparative Analysis of Single - Row versus Double - Row Arthroscopic Rotator Cuff Repair: Techniques, Outcomes, and Clinical Implications

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Abstract: Rotator cuff tears are a common cause of shoulder pain and dysfunction, frequently treated with arthroscopic surgery. Among the available techniques, single - row (SR) and double - row (DR) repairs are the most widely used. This review examines existing literature on SR versus DR arthroscopic rotator cuff repair, focusing on biomechanical integrity, clinical outcomes, re - tear rates, patient satisfaction, and cost - effectiveness and also address the clinical implications of these findings, providing guidance on when each technique may be most appropriate, based on tear size and patient - specific factors.

Keywords: Rotator cuff tear, arthroscopic repair, single - row, double - row, clinical outcomes, re - tear rates, patient satisfaction

1. Introduction

Rotator cuff tears are a significant source of shoulder pain and dysfunction, particularly affecting older adults and those involved in overhead activities. Arthroscopic rotator cuff repair is the gold standard surgical treatment due to its minimally invasive nature and proven effectiveness. The two main techniques used for this procedure are the single - row (SR) and double - row (DR) methods. While both techniques aim to restore tendon - to - bone integrity, they differ in their biomechanical approach and clinical applications.

This article reviews current research comparing SR and DR arthroscopic rotator cuff repair, focusing on key outcomes such as biomechanical integrity, clinical performance, re - tear rates, patient satisfaction, and cost - effectiveness. It provides clinical recommendations based on tear characteristics and patient - specific factors.

2. Biomechanical Considerations

Biomechanical integrity is crucial for successful tendon healing and minimizing the risk of re - tear. The DR technique is designed to replicate the native footprint of the rotator cuff, distributing the load over a broader area by using both medial and lateral anchors. In contrast, SR repair involves placing anchors along the medial edge, resulting in a more focused load distribution.

Studies indicate that DR repairs exhibit superior load - to - failure strength and less gap formation than SR repairs. This advantage may enhance tendon healing by reducing micromotion at the repair site, which can be damaging to repair integrity. However, despite these biomechanical benefits observed in cadaveric models, the clinical relevance of this advantage remains debated.

3. Clinical Outcomes

Both SR and DR techniques lead to substantial improvements in pain relief, shoulder function, and overall

quality of life. However, the DR technique may confer a slight advantage in patients with larger or more complex tears, where greater biomechanical stability is needed. Some studies show that DR repairs result in better shoulder strength and functional scores, especially in abduction.

However, the difference in clinical outcomes between SR and DR repairs is typically small, especially in patients with small to medium - sized tears, where both techniques deliver similar results. For smaller tears, SR repair can be an equally effective and less complex option.

4. Re - Tear Rates

Re - tear rates are a key factor in assessing the durability of rotator cuff repairs. Several studies indicate that DR repair is associated with lower re - tear rates, particularly in large or massive tears, likely due to the increased biomechanical strength provided by the broader footprint. DR repair may also benefit patients with compromised tissue quality or those at higher risk of tendon retraction.

In smaller tears, the difference in re - tear rates between SR and DR repairs is less pronounced, suggesting that SR repair may be sufficient to provide stable and long - lasting healing.

5. Patient Satisfaction

Patient satisfaction following rotator cuff repair is influenced by pain relief, functional recovery, and the ability to return to daily activities or sports. Both SR and DR techniques generally result in high levels of patient satisfaction. Some studies report slightly higher satisfaction rates in patients who underwent DR repair, particularly in those with larger tears where biomechanical strength is critical.

However, the difference in satisfaction levels between the two techniques is often marginal. The alignment of surgical outcomes with patient expectations and pre - operative counseling plays a crucial role in ensuring patient satisfaction, regardless of the chosen technique.

Volume 13 Issue 10, October 2024

Fully Refereed | Open Access | Double Blind Peer Reviewed Journal

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6. Cost - Effectiveness

Cost - effectiveness is a critical factor in healthcare decision - making. DR repair is typically associated with higher initial costs due to the use of additional anchors and longer operative times. However, the potential for lower re - tear rates and reduced need for revision surgeries with DR repair may justify these higher costs in the long run, particularly in patients with large tears.

For smaller tears, where the biomechanical benefits of DR repair may not provide significant advantages, SR repair may be more cost - effective. Studies suggest that SR repair remains a viable, less costly option without compromising clinical outcomes in these cases.

7. Post - Operative Rehabilitation

The type of rotator cuff repair may influence the post - operative rehabilitation protocol. DR repairs, with their enhanced biomechanical strength, may support more conservative rehabilitation approaches to minimize the risk of re - tear. However, rehabilitation protocols should be individualized based on tear size, repair type, and patient - specific factors, such as age, activity level, and overall health.

Regardless of the chosen technique, adherence to a structured rehabilitation program is essential for optimizing outcomes and reducing the likelihood of re - tear.

8. Clinical Implications

The choice between SR and DR arthroscopic rotator cuff repair should be guided by tear size, complexity, and patient factors. DR repair offers biomechanical and clinical advantages for patients with large or complex tears, reducing re - tear rates and improving functional outcomes. However, SR repair remains a highly effective and less costly option for smaller tears.

Surgeons should consider tear characteristics, patient age, activity level, and cost when selecting the most appropriate repair technique. The decision should be tailored to the individual patient's needs, with a focus on optimizing both clinical outcomes and cost - effectiveness.

9. Conclusion

Both SR and DR arthroscopic rotator cuff repair techniques provide significant improvements in pain, function, and quality of life for patients with rotator cuff tears. DR repair offers biomechanical advantages, particularly in large or complex tears, while SR repair is a cost - effective and reliable option for smaller tears.

Surgeons should assess tear characteristics and patient - specific factors when choosing the appropriate technique. Continued research will refine these techniques and further improve patient outcomes, reducing the burden of rotator cuff injuries.

10. Future Directions

Future research should focus on long - term outcomes following SR and DR repairs, particularly in terms of repair durability and patient - reported outcomes such as quality of life. The development of hybrid techniques combining the advantages of both SR and DR approaches may also offer promising avenues for improving the success rates of arthroscopic rotator cuff repair.

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