



REPRESENTATIVE REPORTS USING ARTHROFLEX® SCR

LifeNet Health has distributed over 15,000 ArthroFlex SCR grafts since the Superior Capsule Reconstruction Technique was introduced in the United States using an acellular dermal matrix in 2014. The ArthroFlex SCR allograft bio-implant was designed in conjunction with Arthrex, Inc., as an integral part of an alternative solution to reverse shoulder replacements for patients with irreparable rotator cuff tears and minimal osteoarthritis. LifeNet Health provides high-quality bio-implants with the biomechanical specifications you need to perform successful procedures and understands the safety and quality of your allograft bio-implants are critical to you and your patients. The list of articles below demonstrates the efficacy of ArthroFlex SCR and the Superior Capsular Reconstruction surgery.

Published Literature for SCR with ArthroFlex

Hirahara AM, Andersen WJ, Panero AJ. Superior Capsular Reconstruction: Clinical Outcomes After Minimum 2-Year Follow-Up. AJO. 2017 Nov;46(6): 266-272, 278.

- Authors discuss a series of patients undergoing Superior Capsular Reconstruction with ArthroFlex that have a minimum of two year follow up. After two years post-operatively, “mean ASES score improved significantly....and mean VAS pain score decreased significantly.” “Our data showed SCR with dermal allograft effectively restored the superior restraints in the glenohumeral joint and yielded outstanding clinical outcomes even after 2 years, making it an excellent viable alternative to RTSA.” [Click here for link](#)

Denard PJ, Brady PC, Adams CR, Tokish JM, Burkhart SS. Preliminary Results of Arthroscopic Superior Capsule Reconstruction with Dermal Allograft. Arthroscopy. 2018;34(1):93-9.

- This multicenter, prospective study evaluates the short-term outcomes of arthroscopic SCR with a dermal allograft, ArthroFLEX. The investigators measured range of motion and functional outcome scores of 59 patients pre-operatively and 1 year at final follow-up. The VAS, ASES, and SSV scores all showed statistically significant improvements. The investigators conclude that their “preliminary results are encouraging in this difficult to manage patient population.” [Click here for link.](#)

Pennington WT, Bartz BA, Pauli JM, Walker CE, Schmidt W. Arthroscopic Superior Capsular Reconstruction with Acellular Dermal Allograft for the Treatment of Massive Irreparable Rotator Cuff Tears: Short-Term Clinical Outcomes and the Radiographic Parameter of Superior Capsular Distance. Arthroscopy 2018.

- In a retrospective review, the authors analyzed 88 patients with irreparable rotator cuff tears treated with arthroscopic SCR using an acellular dermal allograft. Patients underwent a minimum 12-month follow-up. The authors used radiography, VAS, and ASES scores to analyze patient outcomes. At 1 year follow-up, VAS and ASES scores improved, 4.0-1.5 and 52-82, respectively. The analysis concludes that arthroscopic SCR with acellular dermal allograft is successful in decreasing pain and improving patient function. [Click here for link.](#)

Hartzler RU and Burkhart SS. Superior Capsular Reconstruction. Orthopedics. 2017 Oct; 40(5): 271-280.

- Authors discuss clinical indication for Superior Capsular Reconstruction as well as some tips for the surgical technique. The senior author (SSB) also discusses his own personal outcomes utilizing ArthroFlex. In 97 patients, 34 have minimum one year follow up. “Only two patients (6%) have had further surgery, both after traumatic reinjury... The remaining 32 patients have all reported satisfaction with the surgery, and there have been no complications” Authors conclude “Superior Capsular Reconstruction is technically demanding, but early adopters of the procedure are supported by its excellent anatomical, biomechanical, and short-term clinical results.” [Click here for link.](#)

Burkhart SS, Denard PJ, Adams CR, Brady PC and Hartzler RU. Arthroscopic Superior Capsular Reconstruction for Massive Irreparable Rotator Cuff Repair. Arthrosc Tech. 2016 Dec; 5(6): e1407-18.

- Authors describe their SCR technique using acellular dermal allograft that they have been performing for 2 years. They have collectively performed more than 100 SCRs using dermal allograft in patients with massive irreparable cuff tears. They state “our early results give us reason to be optimistic that SCR with dermal allograft may be a joint-preserving alternative that is preferable to rTSA for patients with massive irreparable rotator cuff tears.” [Click here for link.](#)

Adams CR, Denard PJ, Brady PC, Hartzler RU, and Burkhart SS. The Arthroscopic Superior Capsular Reconstruction. AJO. 2016 July/August;45(5):320-4.

- Authors describe their surgical technique for superior capsular reconstruction using ArthroFlex and “believe SCR is as a viable alternative” to reverse shoulder arthroplasty. They discuss that “reconstruction of the superior capsule has been shown to restore the normal restraint to superior translation of the humeral head and reestablish a stable fulcrum at the glenohumeral joint.” “The short-term results of this novel procedure have been encouraging, including our own series of patients, in which most patients have had a significant reduction in pain, improvement in function, and very few complications. [Click here for link.](#)

Sanchez G, Chahla J, Moatshe G, Ferrari MB, Kennedy NI, Provencher MT. Superior Capsular Reconstruction With Superimposition of Rotator Cuff Repair for Massive Rotator Cuff Tear. Arthroscopy Techniques. 2017 Oct;6(5):e1775-9.

- Authors describe their technique of Superior Capsular Reconstruction with Rotator Cuff Repair and rehabilitation protocol. They conclude this “may be a reasonable treatment options for irreparable rotator cuff tears in patients wishing to avoid tendon transfer or reverse total shoulder arthroplasty or for whom these treatments are contraindicated.” [Click here for link.](#)

Noyes MP, Denard PJ. Arthroscopic Superior Capsular Reconstruction: Indications and Outcomes. Operative Techniques in Sports Medicine. 2018;26(1):29-34.

- The authors discuss the indications and outcomes of superior capsule reconstruction using ArthroFLEX for irreparable rotator cuff tears. The authors state “this construct has demonstrated satisfactory outcomes with low complication risks.” Furthermore, they conclude that SCR offers an alternative to joint preservation in younger patients with irreparable rotator cuff tears. [Click here for link.](#)

Tokish JT and Beicker C. Superior Capsule Reconstruction Technique Using an Acellular Dermal Allograft. Arthroscopy Techniques. 2015 December 4(6):e833-9.

- Authors present their surgical technique for superior capsule reconstruction using ArthroFlex, as well as describe “an advantage of SCR is that it provides an option to restore and rebalance the force couples necessary for dynamic shoulder function and does not sacrifice any future treatment options.” “The clinical outcomes at our institution are relatively short-term but have shown early promising results.” [Click here for link.](#)

Hirahara AM & Adams CR. Arthroscopic Superior Capsule Reconstruction for Treatment of Massive Irreparable Rotator Cuff Tears. Arthroscopy Techniques. 2015 Dec;4(6):e637-41.

- This article describes an arthroscopic reconstruction of the superior capsule using ArthroFlex. The authors discuss advantages of SCR which include easy graft passage, reliable suture placement, and very strong repairs. They found this technique using a strong, thick dermal graft “allows for faster mobilization postoperatively” and “more accurate measurement and placement of the graft.” [Click here for link.](#)

Petri M, Greenspoon JA, Millett PJ. Arthroscopic Capsule Reconstruction for Irreparable Rotator Cuff Tears. Arthroscopy Techniques. 2015 Dec;4(6):e751-55.

- Authors describe their surgical technique using ArthroFlex, highlighting pitfalls and pearls to the technique. They summarize that SCR “may be a reasonable treatment option in younger patients with irreparable posterosuperior rotator cuff tears wishing to avoid tendon transfer or reverse total shoulder arthroplasty.” [Click here for link.](#)

Katthagen JC, Tahal DS, Millett PJ. Arthroscopic Capsule Reconstruction for Irreparable Rotator Cuff Tears. Orthopedics Today. 2016 Mar 36(3):13-15.

- Authors describe surgical technique using ArthroFlex and comment on their early results that are “18 months from surgery with excellent clinical and structural results.” Postoperative radiographs show cases of re-centering of the humeral head. Patients note pain relief and return of function by 3 months post-op. Authors also report “no complications or adverse events.” [Click here for link.](#)

Sutter GE, Godin JA and Garrigues GE. All-Arthroscopic Superior Shoulder Capsule Reconstruction with Partial Rotator Cuff Repair. Orthopedics. 2017 July 1;40(4): e735-8.

- The authors describe a technique for arthroscopic superior capsular reconstruction with a dermal allograft (ArthroFlex) with a concomitant partial rotator cuff repair. “The authors believe that the described SCR and partial repair work in concert to restore the mechanics of the glenohumeral joint. This is a reproducible technique that improves pain and strength while potentially delaying shoulder arthroplasty.” [Click here for link.](#)

Sanchez G, Rossy WH, Lavery KP, McHale KJ, Ferrari MB, Sanchez A, Provencher MT. Arthroscopic Superior Capsule Reconstruction Technique in the Setting of a Massive, Irreparable Rotator Cuff Tear. Arthrosc Tech. 2017;6(4):e1399-e404.

- In this technical note, the authors discuss their preferred technique for arthroscopic superior capsule reconstruction using a dermal allograft from Arthrex®. The authors highlight the pearls and pitfalls of their technique. They conclude “Although short-term results have been shown to significantly improve overall forward elevation and strength, future long-term studies with larger samples are needed to assess durability of patient reported outcomes.” [Click here for link.](#)

Tokish JM, Momaya A, Roberson T. Superior Capsular Reconstruction with a Partial Rotator Cuff Repair: A Case Report. JBJS Case Connect. 2018 Jan-Mar;8(1):e1.

- Authors present a case study of patient that underwent superior capsular reconstruction with a partial rotator cuff repair. The patient “was doing well at the 1-year follow-up and was very satisfied with the outcome.” [Click here for link.](#)

Other SCR Publications

Arthrex, Inc. Early SCR Outcomes. CC1-00016-EN_H. 2018. Arthrex.com retrieved 5/7/2018.

- Arthrex report of clinical outcomes from their Surgical Outcomes System™. On this report dated 8/26/16 of 284 patients: “Based on these early results, the pain, function and quality of life scores for SCR trend toward favorable outcomes.”

Mihata T, Lee TQ, Fukinishi K, Itami Y, Fujisawa T, Ohue M, Neo M. Return to Sports And Physical Work After Arthroscopic Superior Capsule Reconstruction Among Patients With Irreparable Rotator Cuff Tears. Am J Sports Med. 2018 Apr;46(5):1077-1083.

- Authors evaluated return to sports or work in patients two years after an arthroscopic superior capsule reconstruction. All 26 patients that participated in sports resumed previous activity levels and 32/34 patients were able to return to previous physical work levels. The remaining two patients returned with reduced workloads. They conclude “Arthroscopic SCR restored shoulder function and resulted in high rates of return to recreational sports and physical work.” [Click here for link.](#)

Mihata T, Lee TQ, Watanabe C, Fukunishi K, Ohue M, Tsujimura T, Kinoshita M. Clinical Results of Arthroscopic Superior Capsule Reconstruction for Irreparable Rotator Cuff Tears. *Arthroscopy* 2013;29:459-70.

- Authors discuss original surgical technique using fascia lata autograft and their clinical outcomes at an average 34 months (24-51 months) post-op. "Average clinical outcome scores all improved significantly after ASCR at the final follow-up" (ASES, JOA, UCLA). Radiographic evaluation also revealed "the acromiohumeral distance increased significantly" and MRI revealed 20/24 (83.3%) intact repairs. Authors conclude "ASCR restored glenohumeral stability and function of shoulder joints with irreparable rotator cuff tears." [Click here for link.](#)

Mihata T, Lee TQ, Itami Y, Hasegawa A, Ohue M, Neo M. Superior Capsule Reconstruction for Irreparable Rotator Cuff Tears: A Prospective Study in 100 Consecutive Patients with 1 to 8 Years of Follow-up. *Orthop J Sports Med.* 2016 Mar;4(3 suppl3)

- Authors report "ASCR restored shoulder function and resulted in high rates of return to recreational sport and work." "These results suggest that arthroscopic superior capsule reconstruction is a viable surgical option for patients with irreparable rotator cuff tears, especially in patients who work and enjoy sport." [Click here for link.](#)

Mihata T, McGarry MH, Pirolo JM, Kinoshita M, Lee TQ. Superior Capsule Reconstruction to Restore Superior Stability in Irreparable Rotator Cuff Tears: A Biomechanical Cadaveric Study. *AJSM* 2012;40:2248-55.

- Authors investigated glenohumeral biomechanics after various graft patch techniques. Their conclusion is to attach the patch medially to the superior glenoid and not into the supraspinatus muscle in order to restore stability of the humeral head. This method fully restored both superior translation and subacromial contact pressure without altering glenohumeral joint force. [Click here for link.](#)

Pogorzelski J, Muckenhirn KJ, Mitchell JJ, Katthagen JC, Schon JM, Dahl KD, Hirahara AM, Dines JS, Adams CR, Dooney T, Denard PJ, Turnbull TL, Millett PJ. Biomechanical Comparison of 3 Glenoid-Side Fixation Techniques for Superior Capsular Reconstruction. *AM J Sports Med.* 2018 Mar;46(4):801-8.

- Authors evaluated the biomechanical strength of 3 methods for fixation of the graft to the glenoid for SCR. There were no significant differences in graft [ArthroFlex] elongation or stiffness among the 3 techniques. "Glenoid-side fixation with 3 threaded 3.5-mm suture anchors showed a significant superior pull-out strength when compared with a 4-anchor hybrid technique and thus might be recommended in SCR patients with irreparable superior rotator cuff tears to achieve maximum stability." "Glenoid fixation is essential to provide adequate fixation of the graft to prevent the humeral head from rising and to restore normal biomechanics." [Click here for link.](#)

Peterson AB and Park MC. Superior Capsule Reconstruction. *Current Orthopaedic Practice.* 2017 March/April; 28(2): 142-5.

- Authors perform a literature review for SCR and discuss previous techniques to address irreparable rotator cuff tears, the surgical technique and outcomes from Mihata. They concluded that "SCR is a relatively new technique for the treatment of irreparable rotator cuff tears with a limited body of published data. However, the biomechanical and early clinical results for SCR suggest it to be a promising surgery for patients with regard to both subjective and objective postoperative outcomes." [Click here for link.](#)

Mihata T, Bui CNH, Akeda M, Cavagnaro MA, Kuenzler M, Peterson AB, McGarry MH, Itami Y, Limpisvasti O, Neo M, Lee TQ. A biomechanical cadaveric study comparing superior capsule reconstruction using fascia lata allograft with human dermal allograft for irreparable rotator cuff tear. *J shoulder Elbow Surg.* 2017 Dec;26(12):2158-2166.

- Investigators compared abilities of fascia lata (SCR FL) and human dermal allograft, ArthroFlex, (SCR HDA) to restore shoulder biomechanics in a cadaveric study. Both graft types were able to fully restore superior superior glenohumeral joint force and subacromial contact pressure. Superior glenohumeral joint force translation was fully restored by fascia and partially restored by ArthroFlex. SCR HDA repairs "had significantly greater total ROM compared with the SCR FL repair." [Click here for link.](#)

Rogers JP, Kwapisz A, Tokish JM. Anterior Capsule Reconstruction for Irreparable Subscapularis Tears. Arthroscopy Techniques. 2017 Dec;6(6):e2241-7.

- Authors describe a technique to repair the anterior shoulder capsule following irreparable tear of the subscapularis tendon using ArthroFlex. “Early promising results of SCR for irreparable rotator cuff tears have prompted us to adapt this technique for the anterior capsule reconstruction.” “We have employed this technique for irreparable SSC in the setting of chronic lesions, revision instability cases, as well as in patients with symptomatic subscapularis insufficiency after total shoulder replacement.” [Click here for link.](#)

Thorsness R and Romeo A. Massive Rotator Cuff Tears: Trends in Surgical Management. Orthopedics. 2016 May/June; 39(3): 145-51.

- Authors discuss treatment options for massive rotator cuff tears, including SCR. “Early biomechanical and clinical results have demonstrated the ability to contain the humeral head from superior migration, and in several cases, SCR was able to reverse a pseudoparalytic shoulder. The current authors choose SCR in patients younger than 65 years with massive irreparable rotator cuff tears without evidence of glenohumeral arthritis.” [Click here for link.](#)

Petri M, Greenspoon JA, Moulton SG and Millett PJ. Patch-Augmented Rotator Cuff Repair and Superior Capsule Reconstruction. The Open Orthopaedics Journal, 2016, 10, (Suppl 1: M7) 315-323.

- Authors report on their personal surgical experience and selective literature search for rotator cuff repair and superior capsule reconstruction. “Several case studies have reported promising clinical outcomes for patch-augmented rotator cuff repair.” “Superior capsule reconstruction appears to be an emerging solution when even a partial repair and patch-augmentation are no longer feasible. This technique has been reported biomechanically to restore almost normal glenohumeral kinematics.” [Click here for link.](#)

Narvani AA, Consigliere P, Polyzois I, Sarkhel T, Gupta R and Levy O. The “Pull-Over” Technique for Arthroscopic Superior Capsular Reconstruction. Arthrosc Tech. 2016 Dec; 5(6): e1441-7.

- The authors describe a simple and reproducible technique for SCR to address irreparable rotator cuff tears, as well as explore advantages, risks and pearls for the procedure. They state that “With modern extracellular matrix, advances in processing techniques significantly enhance removal of antigenic material. These processes are reported to exhibit more than 94% removal of DNA, therefore minimizing the risks of immune and inflammatory response and adhesions. We did not have any cases of infection or excessive inflammatory response.” [Click here for link.](#)

Lederman E, Softic D, Qin X, Samsell B, and Dorfman A. Biological Incorporation of ArthroFlex in Superior Capsular Reconstruction for Irreparable Rotator Cuff Repair. LifeNet Health White Paper 68-20-168. 2016.

- Investigators performed histological analysis of an explanted ArthroFlex SCR that had failed as a result of a fall at 10 weeks post-operative. Recellularization and blood vessel formation was observed in addition to tendon-like remodeling on the medial aspect of the graft and fibrocartilage on the inferior surface. “The fibroblast infiltration, neovascularization and tissue remodeling seen here demonstrated that ArthroFlex can adapt to the local environment and have good incorporation following SCR.” Paper available upon request.

1864 Concert Drive
Virginia Beach, VA 23453

Phone: U.S. 1-888-847-7831 ☐ 1-757-464-4761 x2000 (OUS)

Fax: U.S. 1-888-847-7832 ☐ 1-757-464-6439 (OUS)

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