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Technical note

A HYBRID OPEN-ARTHROSCOPIC LATARJET CORACOID BONE-BLOCK TECHNIQUE USING "HyLa" INSTRUMENTATION

Damien LAMI[1], Nicolas FAUVET[1], Matthieu OLLIVIER[1], Jean-Noël ARGENSON[1], Jean-Charles GRILLO[2]

[1] Department of Orthopaedic Surgery, APHM, Institute for Locomotion, Sainte-Marguerite Hospital, Marseille, France.

[2] Polyclinique Les Fleurs, Ollioules, France.

Corresponding author: Nicolas FAUVET

Department of Orthopaedic Surgery, APHM, Institute for Locomotion, Sainte-Marguerite Hospital, 270, Bd Sainte Marguerite, 13006 Marseille, France.

e-mail: nico.fauvet@gmail.com

ABSTRACT

Latarjet coracoid bone-block is a gold-standard procedure for anteroinferior instability of the shoulder. Nowadays, it can be performed as open surgery or entirely under arthroscopy. The pure arthroscopic technique has the advantage of allowing concomitant intra-articular surgery, but involves a long learning curve. Here we present a hybrid concept using dedicated instrumentation comprising a specific guide with or without arthroscopic step, and notably ensuring the safety and reproducibility of the procedure, whatever the modality.

This technique offers an alternative to arthroscopic coracoid bone block, performing the more complex steps as open surgery without major change to Latarjet's original technique, so as to enable concomitant intra-articular surgery if needed while getting around some of the limitations of the purely arthroscopic procedure.

Keywords: Latarjet; arthroscopic Latarjet; shoulder instability; glenohumeral instability; Bankart repair; Hill-Sachs remplissage; HyLa

INTRODUCTION

Latarjet coracoid bone-block is a gold-standard procedure for anteroinferior instability of the shoulder [1–5]. The literature reports long follow-up, with satisfactory long-term clinical results and better control of recurrence than with other shoulder stabilization techniques [6–8]**.** Technically, the procedure is demanding, requiring perfect exposure to guarantee perfect coracoid graft positioning and reduce the risk of complications [9,10] such as neurovascular lesions, especially in the axillary and musculocutaneous nerves [11]. A cut guide seems to improve precision and reproducibility [12,13].

Recent years have witnessed the advent of entirely arthroscopic coracoid bone-block techniques [14–16] and new methods of graft fixation [17]. Their technical demands increase the learning curve and the risk of complications [18–20]: good mastery requires 20-50 procedures, even for well-experienced surgeons.

Macroeconomic studies [21] also suggest considerable extra cost in equipment and personnel for these purely arthroscopic techniques.

Moreover, no added value has been demonstrated unless concomitant intra-articular surgery is planned [22,23]**.**

Nevertheless, the possibility of associating arthroscopy to coracoid bone-block is interesting. In some cases, concomitant procedures such as Hills-Sachs lesion remplissage [24]**,** Bankart repair [25] or cuff repair [26] can be of benefit.

CONCEPT and MATERIAL

All the above considerations encouraged us to develop a hybrid concept with a

dedicated cut guide, offering the choice between associating arthroscopy or not.

We sought to simplify the all-arthroscopic technique, with the following objectives:

- to circumvent the steps that are technically demanding under arthroscopy [27]: coracoid harvesting and preparation, and subscapularis incision; these are performed as open surgery;
- to keep an open option of crossover, respecting the full charge-book of the gold-standard open Latarjet procedure;
- to avoid the extra cost of systematic arthroscopy when it is not necessary.

The HyLa hybrid Latarjet (Newclip) was developed in an anatomy laboratory. It is sterilizable and reusable.

It comprises a dedicated guide (Figure 1) for stable solidity of the pediculated coracoid graft, manipulating it through the subscapularis incision. This can be used in open surgery or in the hybrid procedure, with the aim of:

- ensuring safety by protecting neurovascular structures against the rotating tools;
- enhancing inter-operator reproducibility by ensuring screw parallelism for optimal graft compression;
- controlling graft positioning by avoiding protrusion thanks to an adjustable intra-articular grip (Figure 1).

The “3-in-1” tools (Figure 1) are hand devices for guiding pins, fixing the bone-block to the guide, and unicortical graft tapping to prepare the screwhead imprints. They come in various lengths, to avoid impingement.

The bone-block is stabilized with two 3.5 mm cannulated Herbert self-compression screws, biomechanically validated [28] with predefined pitch of 9.5mm.

The present technical note describes an original Latarjet coracoid bone-block concept with a dedicated guide that can be used in standard open surgery or in a hybrid technique including an arthroscopy step. The technical details are codified and specified below.

SURGICAL TECHNIQUE

1) Core steps: graft preparation and bone-block fixation on guide

The patient is positioned semi-seated; surgery is performed under general anesthesia with interscalene nerve block.

A deltopectoral approach is performed, and the coracoid graft is harvested and freshened on the inferior side. Width is measured by the ruler included in the instrumentation kit (Figure 2) and transposed to the intra-articular grip to ensure screw centering (Figure 3). The graft is then laid aside under the pectoralis major. At this point, an open subscapularis incision is made, whatever the intended procedure.

Depending on the option, the graft is fixed on the guide at different points in time, but following the same order of steps. The 3-in-1 tools are centered by the clip-on guide grip (Figure 4), then the guide is fixed on the bone-block with the following steps: pins introduced through the bone-block; unicortical drilling of the bone-block (Figure 5); then insertion of the tapping part of the 3-in-1 tools into the bone-block (Figure 5). The clip-on

guide grip is then removed.

2) Option 1: open positioning of the bone-block

In this option, after subscapularis incision, glenohumeral joint capsule arthrotomy is performed and the anteroinferior side of the cavity is freshened. The bone-block is then fixed onto the HyLa guide, and the two are fitted against the glenoid; the intra-articular grip helps in positioning the graft subequatorially without lateral protrusion (Figure 6). It can be withdrawn if it hinders the procedure, especially if a Fukuda intra-articular retractor is used. Positioning is then at the surgeon's discretion: the graft can be manipulated easily using the guide.

The graft is fixed temporarily with 2 bicortical K-wires, measured on the ruler (Figure 7). After unicortical glenoid drilling, the screws (Figure 8) are introduced using a stop-check screwdriver to avoid excessive screwhead penetration in the bone-block; K-wires and guide are then withdrawn (Figure 9).

3) Option 2: arthroscopic positioning of the bone-block (movie 1)

In this option, subscapularis incision but not arthrotomy is an open procedure (Figure 10). The bone-block is fixed on the HyLa guide and the two are set aside under the subscapularis split, up against the joint capsule.

Posterior arthroscopy (Figure 11) then begins with joint assessment. Arthrotomy is performed by capsule-labrum release by monopolar probe until the deep subscapularis fibers are exposed. The anteroinferior side of the glenoid is freshened by shaver. An optional anterolateral portal can be performed for instruments or to visualize anterior glenoid freshening (Figure 11).

The guide+graft is then picked up though the subscapularis incision, and the bone-block is positioned and fixed to the glenoid as described for open surgery, but under arthroscopic control.

Associated intra-articular procedures are executed at different steps, depending on their type:

- For remplissage of Hills-Sachs lesion by infraspinatus capsule-tenodesis, anchor positioning and suture passing is performed after capsule-labrum release and before positioning the bone-block, while tendon suturing is performed after bone-block fixation.
- For capsule-labrum reinsertion, anchor positioning and suture passing is performed after bone-block fixation.
- For rotator cuff repair, preparation is performed before capsule-labrum release, to optimize intra-articular pressure. As repair is mostly within the subacromial space, the question of pressure is relative, based mainly on intraoperative control of bleeding and blood pressure.

Crossover from arthroscopy to open surgery with or without guide is possible at any point.

CONCLUSION

The present concept aims primarily to simplify the all-arthroscopic Latarjet coracoid bone-block technique while still allowing associated arthroscopic procedures, and to ensure safety and inter-operator reproducibility without significant change in technique

with respect to the classical Latarjet procedure.

To validate these objectives, further studies are underway in a cohort operated on using the HyLa instrumentation, with CT assessment of graft positioning and analysis of the learning curve and inter-operator reproducibility.

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DISCLOSURE OF INTEREST

Nicolas Fauvet – no conflicts of interest

Damien Lami - Newclip (HyLa instrumentation designer)

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Jean-Noël Argenson – Symbios (royalties) / Zimmer (royalties – consultant) / EKA (president) / SOFCOT (permanent board member) / JBJS (board member)

Jean-Charles Grillo - Newclip (HyLa instrumentation designer)

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Damien Lami: study design, instrumentation design / article writing and re-editing

Nicolas Fauvet: article writing and re-editing / figures

Jean-Charles Grillo: study design, instrumentation design / article writing and re-editing

Matthieu Ollivier: study design / re-editing

Jean Noël Argenson: study design / re-editing

All authors approved the final version of the manuscript for submission

FIGURES

Figure 1: Diagram of HyLa guide for coracoid bone-block positioning. a: Cut guide protecting soft tissue. b: Intra-articular grip preventing protrusion. c: Handle for ease of use. d: Clipped support grip. e: 3-in-1 tool, shown outside the guide, to attach bone-block to guide. f: 2-in-1 ruler to measure bone-block width and screw size. g: 3.5 mm Herbert cannulated self-compression screw. h: Coracoid bone-block.

Figure 2: Diagram and intraoperative view of bone-block width measurement by the 2-in-1 ruler provided in the kit.

a: 2-in-1 ruler. b: Coracoid bone-block.

Figure 3: Diagram and intraoperative view of transposing graft width to the adjustable grip to ensure optimal centering of K-wires then screws in the bone-block.

a: HyLa guide. b: Intra-articular grip.

Figure 4: Diagram and intraoperative view of positioning the clipped support grip to ensure optimal centering of K-wires then screws in the bone-block.

a: HyLa guide. b: Intra-articular grip. c: Coracoid bone-block. d: Clipped support grip.

Figure 5: Diagram and intraoperative view of attachment of guide and graft by 3-10-1 tools.

a: HyLa guide. b: Clipped support grip. c: Coracoid bone-block. d: 3-in-1 tool

Figure 6: Diagram and intraoperative view of guide+graft positioning against glenoid.

a: HyLa guide. b: Intra-articular grip against glenoid. c: Glenoid joint surface.

Figure 7: Intraoperative view of screw sizing with ruler.

a: HyLa guide. b: Intra-articular grip against glenoid. c: 3-in-1 tool. d: ruler. e: K-wire.

Figure 8: Diagram of assembly with guide still in place.

a: HyLa guide. b: Intra-articular grip. c: Coracoid bone-block. d: Screw in final position.

Figure 9: Final result: diagram, intraoperative view, radiographic view.

Figure 10: Intraoperative view of subscapularis split with intact joint capsule.

a: Subscapularis muscle retracted by chisel. b: Intact joint capsule. c: Chisel.

Figure 11: Intraoperative view of arthroscopic portals.

a: Guide+graft. b: Optional anterolateral portal. c: Posterior portal. d: Arthroscope.

Movie 1: Arthroscopic procedure with explanations (here, with capsule-labrum reinsertion)

References

1. Walch G, Boileau P. Latarjet-Bristow Procedure for Recurrent Anterior Instability. Tech Shoulder Elb Surg. Oct 2000;1(4):256-261.

2. Latarjet. Treatment of recurrent dislocation of the shoulder. Lyon Chir. Nov 1, 1954;49(8):994-7.

3. Young AA, Maia R, Berhouet J, Walch G. Open Latarjet procedure for management of bone loss in anterior instability of the glenohumeral joint. J Shoulder Elbow Surg. March 2011;20(2 Suppl):S61-69.

4. Plancher KD, Petterson SC, Walch G. Open Latarjet: A Reliable, Successful Method to Prevent Recurrence in the Presence of Bony Defects. Oper Tech Sports Med. Dec 1, 2013;21(4):238-45.

5. Balg F, Boileau P. The instability severity index score. A simple pre-operative score to select patients for arthroscopic or open shoulder stabilisation. J Bone Joint Surg Br. Nov 2007;89(11):1470-7.

6. Zimmermann SM, Scheyerer MJ, Farshad M, Catanzaro S, Rahm S, Gerber C. Long-Term Restoration of Anterior Shoulder Stability: A Retrospective Analysis of Arthroscopic Bankart Repair Versus Open Latarjet Procedure. J Bone Joint Surg. Dec 7, 2016;98(23):1954–1961.

7. Hurley ET, Jamal MS, Ali ZS, Montgomery C, Pauzenberger L, Mullett H. Long-term outcomes of the Latarjet procedure for anterior shoulder instability: a systematic review of studies at 10-year follow-up. J Shoulder Elbow Surg. Feb 2019;28(2):e33-9.

8. Chillemi C, Guerrisi M, Paglialunga C, Salate Santone F, Osimani M. Latarjet procedure for anterior shoulder instability: a 24-year follow-up study. Arch Orthop Trauma Surg. March 27, 2020;

9. Griesser MJ, Harris JD, McCoy BW, Hussain WM, Jones MH, Bishop JY, et al. Complications and re-operations after Bristow-Latarjet shoulder stabilization: a systematic review. J Shoulder Elbow Surg. Feb 1, 2013;22(2):286-92.

10. Gupta A, Delaney R, Petkin K, Lafosse L. Complications of the Latarjet procedure. Curr Rev Musculoskelet Med. March 1, 2015;8(1):59-66.

11. Shah AA, Butler RB, Romanowski J, Goel D, Karadagli D, Warner JJP. Short-Term Complications of the Latarjet Procedure. J Bone Joint Surg. March 21, 2012;94(6):495–501.

12. Barth J, Boutsiadis A, Neyton L, Lafosse L, Walch G. Can a Drill Guide Improve the Coracoid Graft Placement During the Latarjet Procedure: A Prospective Comparative Study With the Freehand Technique. Orthop J Sports Med. Oct 2017;5(10):2325967117734218.

13. Meyer DC, Moor BK, Gerber C, Ek ETH. Accurate coracoid graft placement through use of

a drill guide for the Latarjet procedure. J Shoulder Elbow Surg. May 2013;22(5):701-8.

14. Lafosse L, Boyle S. Arthroscopic Latarjet procedure. J Shoulder Elbow Surg. March 2010;19(2 Suppl):2-12.

15. Lafosse L, Lejeune E, Bouchard A, Kakuda C, Gobezie R, Kochhar T. The arthroscopic Latarjet procedure for the treatment of anterior shoulder instability. Arthrosc J Arthrosc Relat Surg. Nov 2007;23(11):1242.e1-5.

16. Boileau P, Mercier N, Roussanne Y, Thélu C-É, Old J. Arthroscopic Bankart-Bristow-Latarjet procedure: the development and early results of a safe and reproducible technique. Arthrosc J Arthrosc Relat Surg. Nov 2010;26(11):1434-50.

17. Boileau P, Gendre P, Baba M, Thélu C-É, Baring T, Gonzalez J-F, et al. A guided surgical approach and novel fixation method for arthroscopic Latarjet. J Shoulder Elbow Surg. Jan 2016;25(1):78-89.

18. Kordasiewicz B, Kiciński M, Małachowski K, Boszczyk A, Chaberek S, Pomianowski S. Arthroscopic Latarjet Stabilization: Analysis of the Learning Curve in the First 90 Primary Cases: Early Clinical Results and Computed Tomography Evaluation. Arthrosc J Arthrosc Relat Surg. 2019;35(12):3221-37.

19. Leuzinger J, Brzoska R, Métais P, Clavert P, Nourissat G, Walch G, et al. Learning Curves in the Arthroscopic Latarjet Procedure: A Multicenter Analysis of the First 25 Cases of 5 International Surgeons. Arthrosc J Arthrosc Relat Surg. 2019;35(8):2304-11.

20. Valsamis EM, Kany J, Bonnevialle N, Castricini R, Lädermann A, Cunningham G, et al. The arthroscopic Latarjet: a multisurgeon learning curve analysis. J Shoulder Elbow Surg. Apr 2020;29(4):681-8.

21. Randelli P, Fossati C, Stoppani C, Evola FR, De Girolamo L. Open Latarjet versus arthroscopic Latarjet: clinical results and cost analysis. Knee Surg Sports Traumatol Arthrosc. Feb 2016;24(2):526-32.

22. Horner NS, Moroz PA, Bhullar R, Habib A, Simunovic N, Wong I, et al. Open versus arthroscopic Latarjet procedures for the treatment of shoulder instability: a systematic review of comparative studies. BMC Musculoskelet Disord. Jul 25, 2018;19(1):255.

23. Kordasiewicz B, Małachowski K, Kicinski M, Chaberek S, Pomianowski S. Comparative study of open and arthroscopic coracoid transfer for shoulder anterior instability (Latarjet)-clinical results at short term follow-up. Int Orthop. May 2017;41(5):1023-33.

24. Saliken D, Lavoué V, Trojani C, Gonzalez J-F, Boileau P. Combined All-arthroscopic Hill-Sachs Remplissage, Latarjet, and Bankart Repair in Patients With Bipolar Glenohumeral Bone Loss. Arthrosc Tech. Oct 2017;6(5):e2031-7.

25. Boileau P, Thélu C-É, Mercier N, Ohl X, Houghton-Clemmey R, Carles M, et al. Arthroscopic Bristow-Latarjet Combined With Bankart Repair Restores Shoulder Stability in

Patients With Glenoid Bone Loss. Clin Orthop. Aug 2014;472(8):2413-24.

26. Jouve F, Graveleau N, Nové-Josserand L, Walch G. Recurrent anterior instability of the shoulder associated with full thickness rotator cuff tear: results of surgical treatment. Rev Chir Orthop Reparatrice Appar Mot. Nov 2008;94(7):659-69.

27. Metais P, Clavert P, Barth J, Boileau P, Brzoska R, Nourissat G, et al. Preliminary clinical outcomes of Latarjet-Patte coracoid transfer by arthroscopy vs. open surgery: Prospective multicentre study of 390 cases. Orthop Traumatol Surg Res. 2016;102(8S):S271-6.

28. Massin V, Lami D, Ollivier M, Pithioux M, Argenson J-N. Comparative biomechanical study of five systems for fixation of the coracoid transfer during the Latarjet procedure for treatment of anterior recurrent shoulder instability. Int Orthop. May 12, 2020;