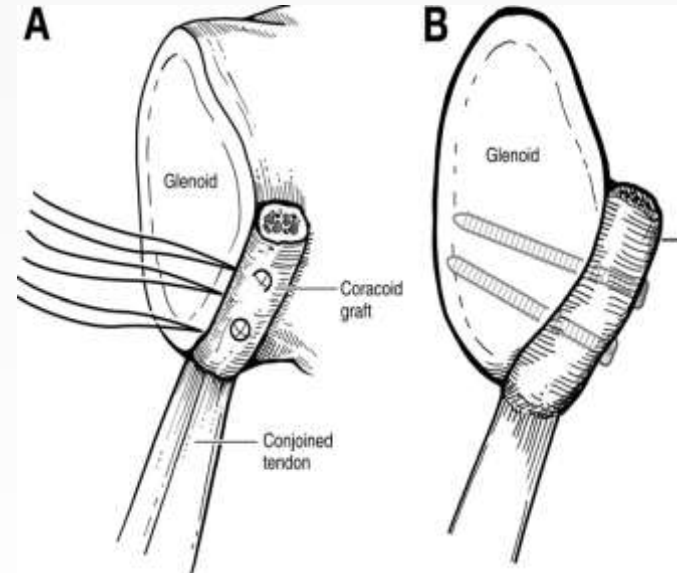
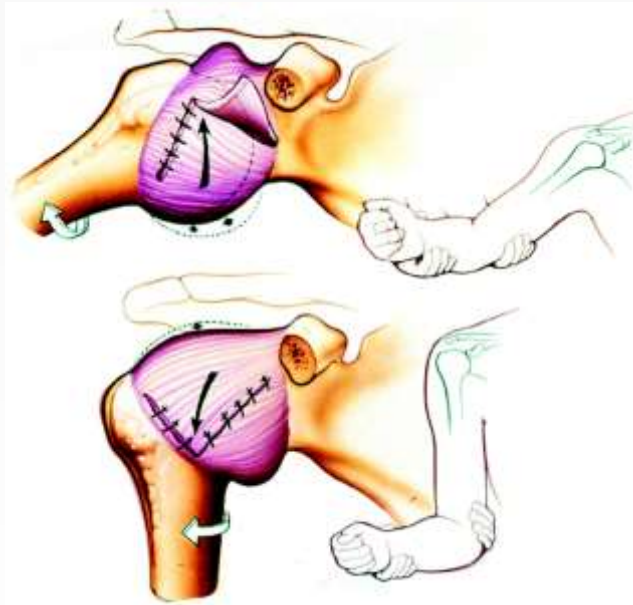


Open or arthroscopic revision surgery for recurrent shoulder instability?



Andreas Panagopoulos, MD, Ph.D.

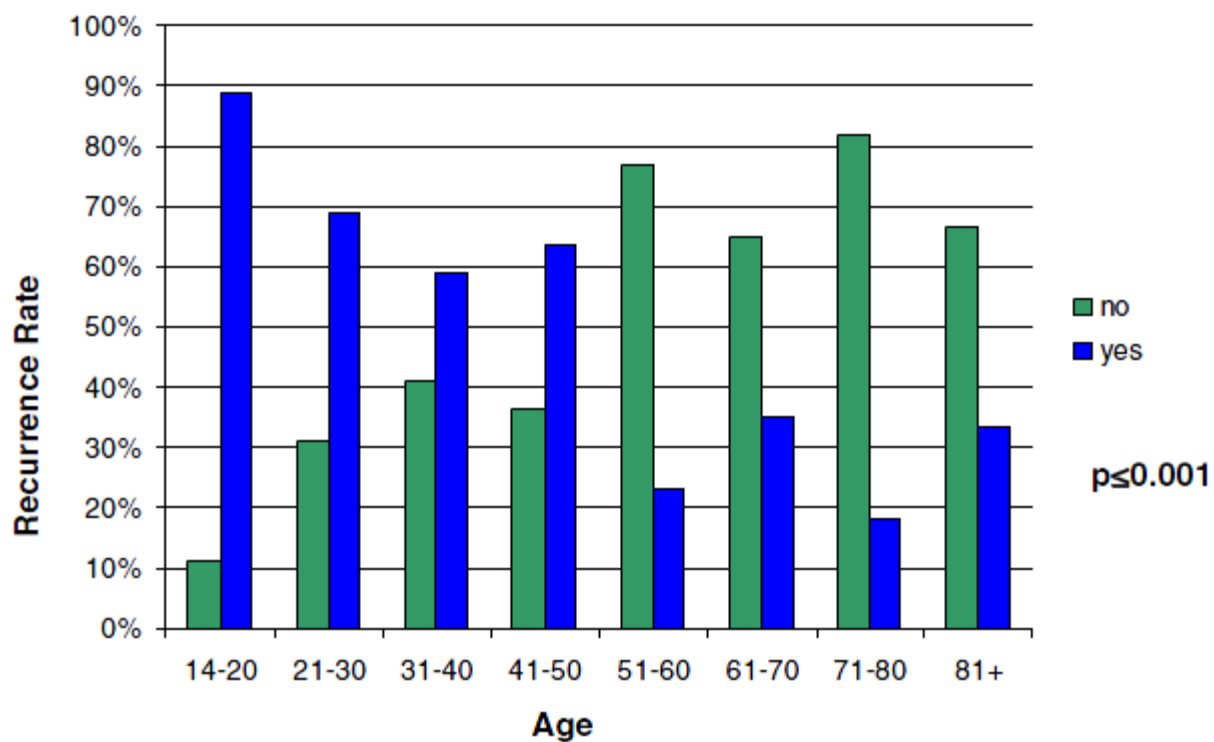
**Assistant Professor in Orthopedics, Medical School, Patras University
Sports Medicine & Upper Limb Surgeon, Patras University Hospital**

Objectives

- Understand the natural history of shoulder dislocation
- Investigate the reasons for failure after instability surgery
- Identify the risk factors for recurrence after the index operation
- Analyse the literature, especially large series and meta-analyses
- Surgical tips to avoid recurrences

Has the management of shoulder dislocation changed over time?

Byron Chalidis • Nick Sachinis • Christos Dimitriou •
Pericles Papadopoulos • Efthimios Samoladas •
John Pournaras

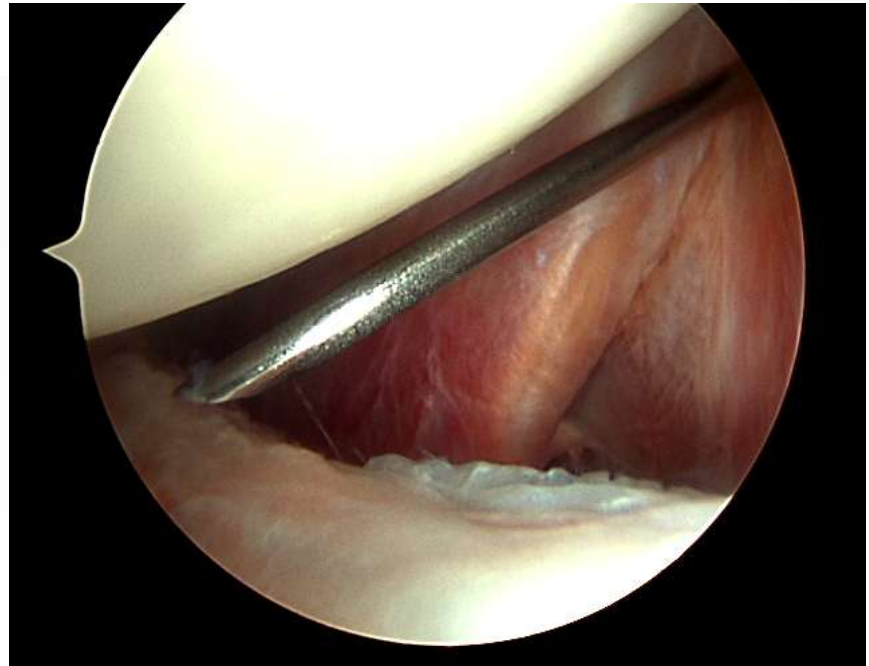


Primary anterior shoulder dislocation in young athletes: fix them!

Pietro Randelli • Ettore Taverna

Re-dislocation

- conservative 60-75%
- surgical 11-20%



Best current practice

Widespread acceptance of an **all-arthroscopic** approach to shoulder instability is lacking, partly because of the high failure rate that was reported in early studies

Stein DA, et al. Arthroscopic stabilization of anterior shoulder instability: A review of the literature. Arthroscopy 2002;18:912-924.

Hobby J, Griffin D, Dunbar M, Boileau P. Is arthroscopic surgery for stabilisation of chronic shoulder instability as effective as open surgery? A systematic review and meta-analysis of 62 studies including 3044 arthroscopic operations. J Bone Joint Surg Br 2007;89:1188-1196.

Arthroscopic Versus Open Repair for Traumatic Anterior Shoulder Instability: A Meta-analysis

Nicholas G. H. Mohtadi, M.D., F.R.C.S.C.,

Ivan J. Bitar, M.D., Treny M. Sasyniuk, B.P.E., Robert M. Hollinshead, M.D., F.R.C.S.C.,
and Wade P. Harper, M.B.B.S., F.R.A.C.S.(Orth)

TABLE 4. *Surgical Outcomes*

Study	Total No. of Shoulders		Recurrence		Reoperation*		RTA		Traumatic Recurrence	
	Arthro	Open	Arthro	Open	Arthro	Open	Arthro	Open	Arthro	Open
Cole et al. ^{47,48}	37	22	6	2	2	1	33	22	6	2
Geiger et al. ⁵¹	16	17	7	2	4	0	8	16	DNR	DNR
Guanche et al. ⁵⁰	15	12	5	1	2	0	11	9	DNR	DNR
Jorgensen et al. ⁶⁰	21	20	2	2	1	0	18	20	1	0
Karlsson et al. ⁵⁷	60	48	9	5	4	3	DNR	DNR	DNR	DNR
Kartus et al. ⁶¹	18	18	0	1	0	1	DNR	DNR	DNR	DNR
Kim and Ha ⁵⁶	59	30	2	2	2	2	DNR	DNR	2	2
Sperber et al. ⁵⁹	43	13	15	4	DNR	DNR	26	9	DNR	DNR
Steinbeck and Jerosch ⁵³	30	26	7	3	2	1	DNR	DNR	2	1
Roberts et al. ⁵⁸	30	32	5	2	3	0	25	30	1	1
Weber ⁶²	43	106	7	4	5	3	19	68	6	4

Research performed from 1966 to October 31, 2003

Systematic Review

Long-Term Outcomes After Bankart Shoulder Stabilization

Joshua D. Harris, M.D., Anil K. Gupta, M.D., M.B.A., Nathan A. Mall, M.D.,
 Geoffrey D. Abrams, M.D., Frank M. McCormick, M.D., Brian J. Cole, M.D., M.B.A.,
 Bernard R. Bach Jr., M.D., Anthony A. Romeo, M.D., and Nikhil N. Verma, M.D.

Table 7. Comparison of All Surgical Techniques Analyzed

	Arthroscopic Bankart Repair With Suture Anchors	Arthroscopic Bankart Repair With Tacks	Arthroscopic Bankart Repair With Transglenoid Caspari Technique	All-Arthroscopic Bankart Techniques (n = 584)	Open Bankart Repair (n = 731)
Length of follow-up (yr)	7.3	11.5	8.4	9.1	13.1
Recurrent dislocation rate (%)	8.5	17	8	11	8
Recurrent subluxation rate (%)	4	7	3	5	5
Timing of recurrent instability (yr)	2.2	3.1	1.2	2.5	3.7
% of recurrently unstable patients who underwent revision surgery	57	30	67	41	19
% of recurrent instability due to new trauma	60	48	35	48	24
% of radiographic OA					
Overall	26	56	19	39	33
Mild	12	38	12	25	23
Moderate	12	15	6	12	5
Severe	2	3	1	2	5
Rate of return to sport at preinjury levels	87	53	79	74	89
Final follow-up Rowe score	84.6	92.0	88.8	87.2	85.6
Final follow-up Constant score	90.6	82.3	88.1	86.4	82.2
Final follow-up WOSI score	NR	419	NR	NR	NR

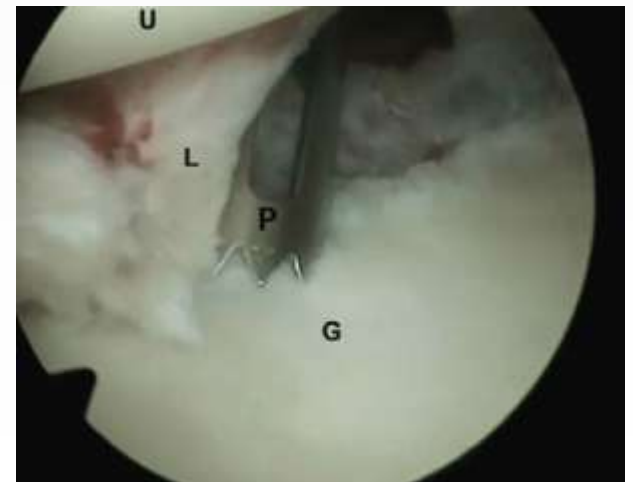
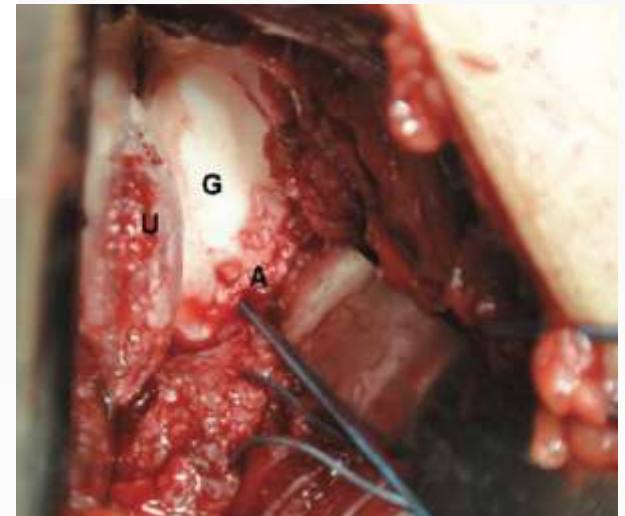
NR, not reported; OA, osteoarthritis.

Treatment of Bankart Lesions in Traumatic Anterior Instability of the Shoulder: A Randomized Controlled Trial Comparing Arthroscopy and Open Techniques

Nicola Archetti Netto, M.D., Ph.D., Marcel Jun Sugawara Tamaoki, M.D., Ph.D.,
 Mario Lenza, M.D., Ph.D., João Baptista Gomes dos Santos, M.D., Ph.D.,
 Marcelo Hide Matsumoto, M.D., Ph.D., Flavio Faloppa, M.D., Ph.D., and
 João Carlos Belloti, M.D., Ph.D.

TABLE 2. DASH, UCLA, and Rowe Scores

Endpoint	Technique		Comparison
	Open (n = 25)	Arthroscopic (n = 17)	
DASH			$P = .031$
Mean (SD)	4.22 (5.8)	2.65 (7.3)	
Median	1.66	0	
Range	0-20.83	0-24.16	
UCLA			
Good/excellent (%)	23 (92.0)	16 (94.1)	
Fair/poor (%)	2 (8.0)	1 (5.9)	$P > .999$
Rowe			
Excellent (%)	20 (80)	13 (76.5)	
Good (%)	5 (20)	1 (5.9)	
Fair (%)	0	3 (17.6)	$P > .999$



Same rate of recurrence

Patient Perceptions of Open and Arthroscopic Shoulder Surgery

John W. Sperling, M.D., M.B.A., Adam M. Smith, M.D., Robert H. Cofield, M.D.,
and Sunni Barnes, Ph.D.

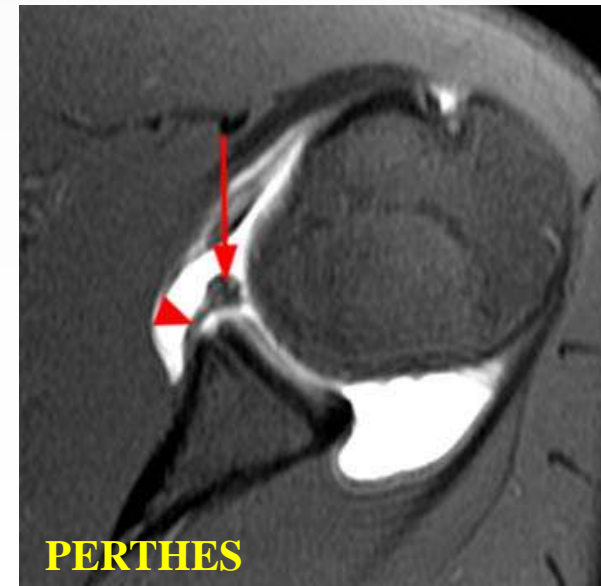
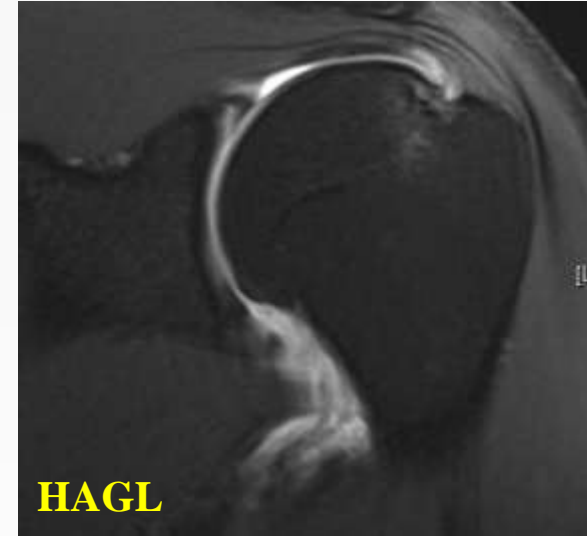
TABLE 1. Patient Perceptions of Open and Arthroscopic Surgery

	Center A			Center B		
	Open	Arthroscopy	No Difference	Open	Arthroscopy	No Difference
My hospital stay will be shorter	0%	88%	12%	3%	81%	16%
My surgery will be less expensive	6%	68%	26%	12%	52%	36%
My recovery will be faster	1%	91%	8%	3%	87%	10%
I will have less pain	2%	79%	19%	4%	79%	17%
I will have better motion*	10%	44%	46%	5%	68%	26%
My time away from activities will be shorter	3%	84%	13%	3%	81%	16%
My long-term outcome will be better*	13%	42%	45%	7%	60%	33%

* $P < .05$ (χ^2 test).

Why we have this improvement?

- “modern” arthroscopic techniques
- the multifactorial etiology of GH instability
- recognition of complex injury patterns (advanced imaging)
- increasing learning curve



Current Concepts With Video Illustration

The Rationale for an Arthroscopic Approach to Shoulder Stabilization

Fotios P. Tjoumakaris, M.D., and James P. Bradley, M.D.

... arthroscopy should be the preferred method of repair for anterior, posterior and MD instability, because the results show equal stability, better motion, improved functional outcomes, and most importantly, return to sports

Concise Review

Arthroscopic Shoulder Stabilization:
Is There Ever a Need to Open?

Eric J. Kropf, M.D., Fotios P. Tjoumakaris, M.D., and Jon K. Sekiya, M.D.

Arthroscopic stabilization is clearly contraindicated when a significant pathologic lesion cannot be adequately addressed as a result of the **limitations of current techniques or instrumentation.**

Open Operative Treatment for Anterior Shoulder Instability: When and Why?

Peter J. Millett, Philippe Clavert and Jon J.P. Warner
J Bone Joint Surg Am. 87:419-432, 2005. doi:10.2106/JBJS.D.01921

Equipment & lack of expertise

Marked bony deficiencies

Capsular ruptures,
Failed thermal capsulorrhaphy

RC lesions?

HAGL lesions?

Collision athletes?

Revision arthroscopic surgery?

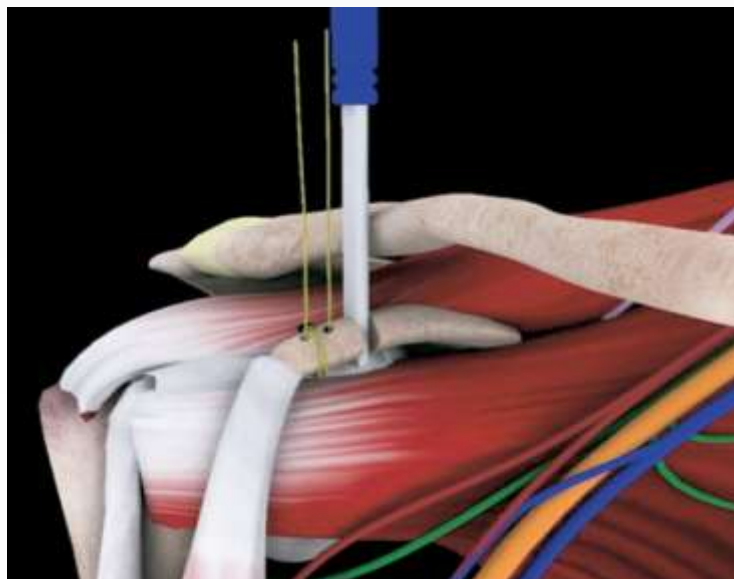
Engaging Hill-Sachs
defect (>30%)

Significant glenoid
bone defects (>25%)

Technical Note

The Arthroscopic Latarjet Procedure for the Treatment of Anterior Shoulder Instability

Laurent Lafosse, M.D., Etienne Lejeune, M.D., Antoine Bouchard, M.D., Carlos Kakuda, M.D.,
Reuben Gobeze, M.D., and Tony Kochhar, M.Sc., F.R.C.S.(Tr&Orth)



Combined arthroscopic Bankart repair & remplissage

Systematic Review

Combined Arthroscopic Bankart Repair and Remplissage for Recurrent Shoulder Instability

Timothy Leroux, M.D., Arman Bhatti, B.A., Amir Khoshbin, M.D.,
David Wasserstein, M.D., M.Sc., F.R.C.S.C., Patrick Henry, M.D., F.R.C.S.C.,
Paul Marks, M.D., F.R.C.S.C., Kirat Takhar, B.Kin., Christian Veillette, M.D., M.Sc., F.R.C.S.C.,
John Theodoropoulos, M.D., F.R.C.S.C., and Jaskarndip Chahal, M.D., M.Sc., F.R.C.S.C.

Arthroscopy: The Journal of Arthroscopic and Related Surgery, Vol 29, No 10 (October), 2013: pp 1693-1701

**7 clinical studies, 220 pt
recurrent dislocation 3.4%**



Table 4. The Rate of Recurrent Dislocation and Subluxation

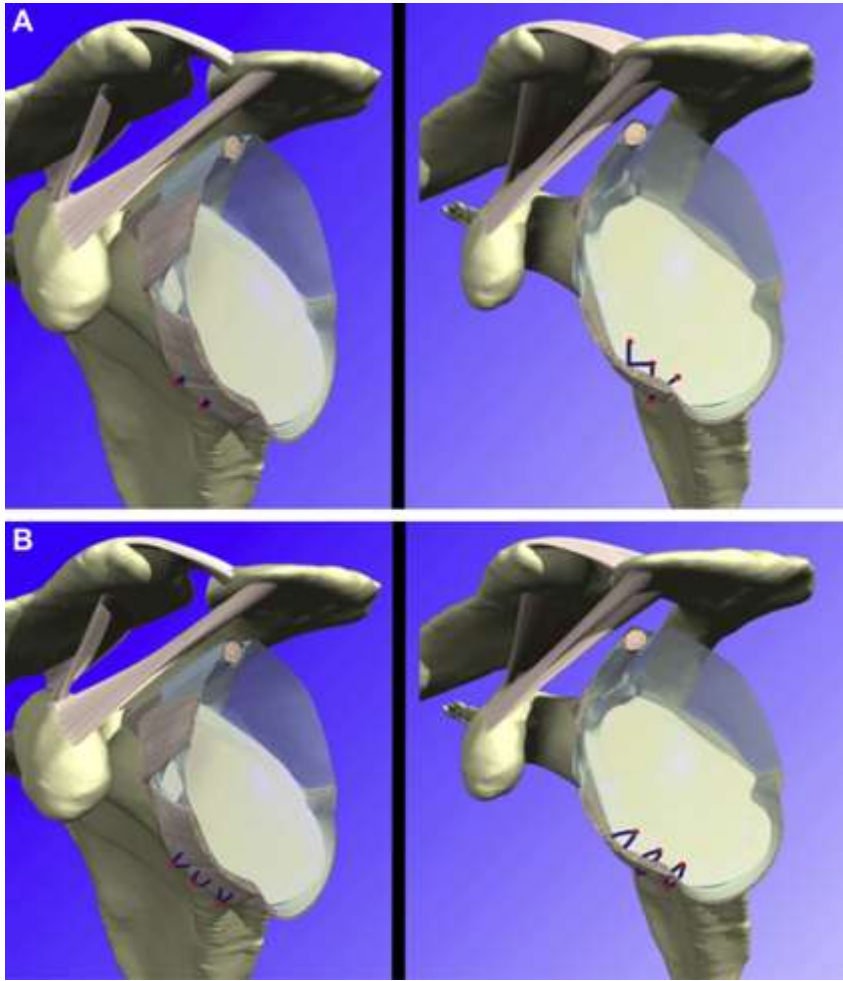
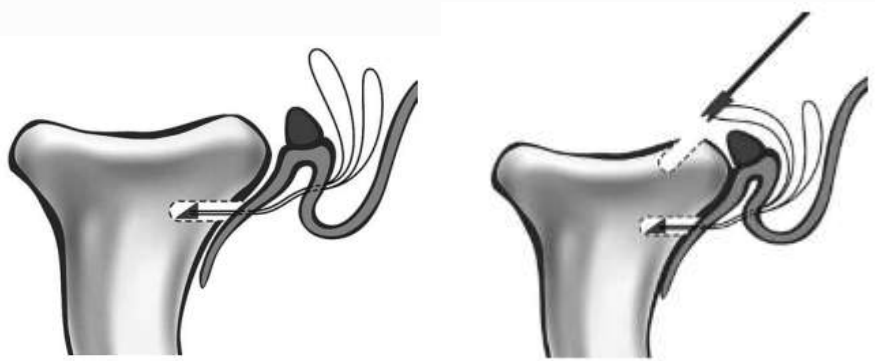
Study	Procedure Type	Patient Number	Recurrent Dislocation Rate	Recurrent Subluxation Rate	Combined Recurrent Dislocation and Subluxation Rate
Franceschi et al. ³⁹	BRR	25	0% (0 of 25)	0% (0 of 25)	0% (0 of 25)
	BR*	25	12.0% (3 of 25)	8.0% (2 of 25)	20.0% (5 of 25)
Nourissat et al. ¹	BRR	15	6.7% (1 of 15)	NR [†]	NA
	BR [†]	17	5.9% (1 of 17)	NR [†]	NA
Park et al. ³⁴	BRR	11	9.1% (1 of 11)	0% (0 of 11)	9.1% (1 of 11)
Park et al. ³⁵	BRR	20	10.0% (2 of 20)	5.0% (1 of 20)	15.0% (3 of 20)
Zhu et al. ³⁸	BRR	49	2.0% (1 of 49)	4.1% (2 of 29)	6.1% (3 of 49)
Haviv et al. ³⁷	BRR	11	0% (0 of 11)	NR [†]	NA
Boileau et al. ³⁶	BRR	47	2.1% (1 of 47)	0% (0 of 47)	2.1% (1 of 47)
Total	BRR	178	3.4% (6 of 178)	2.0% (3 of 152)	5.3% (8 of 152)

Arthroscopic Double-Row Anterior Stabilization and Bankart Repair for the “High-Risk” Athlete

Cathal J. Moran, M.D., F.R.C.S.(Orth), Peter D. Fabricant, M.D., M.P.H.,
Richard Kang, M.D., and Frank A. Cordasco, M.D., M.S.

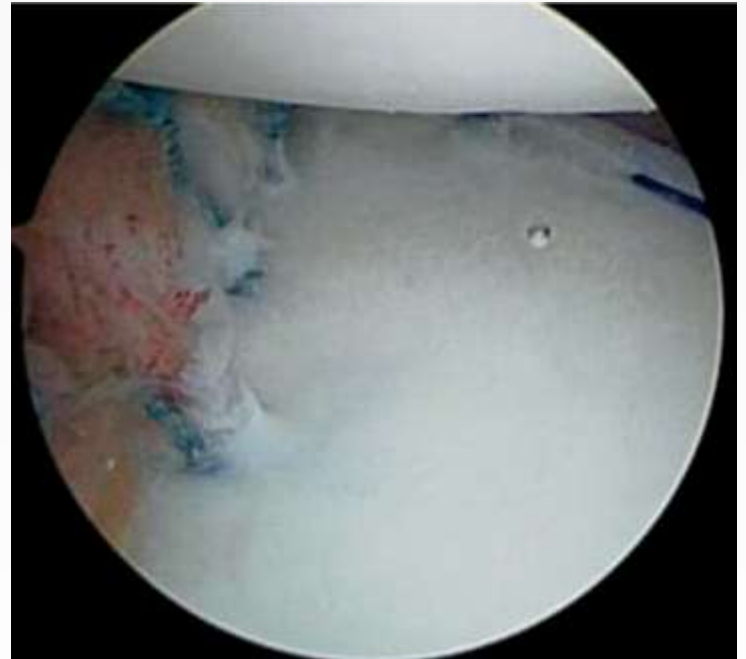
Arthroscopy Techniques, Vol ■, No ■ (Month), 2014: pp e1-e7

Cassiopeia (“W”) technique
Convergent (“M”) technique



Reasons for failure after instability surgery

incorrect previous diagnosis,
inadequate correction of lesions,
technical mistakes,
new injury,
improper rehabilitation



Risks factors for failed operative GHJ stabilization

Patient factors

- young age
- male gender
- collision athletes

Surgeon factors

- misdiagnosis (MDI, posterior instability)
- failure to address capsular laxity
- failure to address humeral head defects (>20-40%)
- failure to address glenoid defects (>25%)
- non-anatomic labral repair

Outcomes After Bankart Repair in a Military Population: Predictors for Surgical Revision and Long-Term Disability

Arthroscopy. 2014 (2):172-7.

MAJ Brian R. Waterman, M.D., MC, USA, MAJ Travis C. Burns, M.D., MC, USA,
MAJ Brendan McCriskin, M.D., MC, USA, MAJ Kelly Kilcoyne, M.D., MC, USA,
Kenneth L. Cameron, Ph.D., M.P.H., A.T.C., and LTC Brett D. Owens, M.D., MC, USA

3,854 Bankart repair (84% arthroscopically)

92% men, mean age 28.0 years

193 patients (5.0%) revision stabilization

339 patients (8.8%) were medically discharged

4 factors associated with surgical failure

- younger age
- higher facility volume,
- open repair: failure rate 7.7% (only 4.5% arthroscopically)
- inpatient status

1 in 20 military service members required revision surgery

Diagnostic Pearls: Identifying Patients at Risk

History

Atraumatic dislocation episodes
Instability in midrange of motion

Physical examination

Positive Gagey test,
(hyper-adduction beyond 105°)

Positive bony apprehension test
(45° external rotation, 45° abduction)



Diagnostic Pearls: Identifying Patients at Risk

Radiographic imaging

Large glenoid defect (West Point view)

Large humeral head defect (Stryker notch view)

CT or MRI

humeral head defects 20%-40%

or glenoid defects 25%

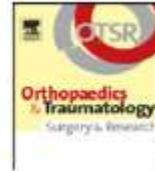
ISIS: Instability severity index score > 6





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ORIGINAL ARTICLE

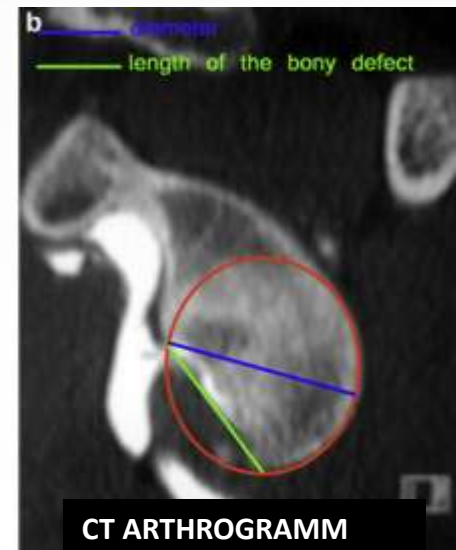
Recurrence after arthroscopic Bankart repair: Is quantitative radiological analysis of bone loss of any predictive value?

C. Sommaire^{a,*}, C. Penz^a, P. Clavert^a, S. Klouche^b, P. Hardy^{b,c}, J.F. Kempf^a

Overall recurrence rate was 15.6% (77 pt).

Recurrence risk was significantly greater:

- humeral notch length (d/r) was $> 20\%$
- and the Gerber X ratio $> 40\%$.



The instability severity index score

A SIMPLE PRE-OPERATIVE SCORE TO SELECT PATIENTS FOR ARTHROSCOPIC OR OPEN SHOULDER STABILISATION

F. Balg,
P. Boileau

J Bone Joint Surg [Br]
2007;89-B:1470-7.

ISIS > 6

Prognostic factors	Points
Age at surgery (yrs)	
≤ 20	2
> 20	0
Degree of sport participation (pre-operative)	
Competitive	2
Recreational or none	0
Type of sport (pre-operative)	
Contact or forced overhead	1
Other	0
Shoulder hyperlaxity	
Shoulder hyperlaxity (anterior or inferior)	1
Normal laxity	0
Hill-Sachs on AP* radiograph	
Visible in external rotation	2
Not visible in external rotation	0
Glenoid loss of contour on AP radiograph	
Loss of contour	2
No lesion	0
Total (points)	10



Can we improve the indication for Bankart arthroscopic repair? A preliminary clinical study using the ISIS score

H. Thomazeau^{a,*}, O. Courage^b, J. Barth^c, C. Pélégri^d, C. Charousset^e, F. Lespagnol^f, G. Nourissat^g, S. Audebert^h, S. Guilloⁱ, B. Toussaint^j, L. Lafosse^j, J. Bradel^k, D. Veillard^l, P. Boileau^d, the French Arthroscopy Society

11 centers prospectively included
125 patients

anterior instability-Bankart repair

ISIS < 4/10

minimum 3 anchors

mean follow-up of 18 months

3.2% recurrence

Good Rowe scores (82%)

Preferred procedure	France (n = 70) (%)	World (n = 101) (%)
Open Latarjet	72	8
Open Bankart	1.5	6
Arthroscopic Bankart	25	90
Others	1.5	4
Total	100	108

Management of recurrent instability

Conservative treatment

immobilization in external rotation,
graduated physical therapy program
education regarding at-risk shoulder positions
activity modification

Cause of failure?

1. arthroscopy or open procedure
2. soft-tissue procedure alone or additional bony procedure

MUA and diagnostic arthroscopy always

Types of procedures

Revision arthroscopic repair (Bankart)
and/or capsular plication

Arthroscopy after open repair

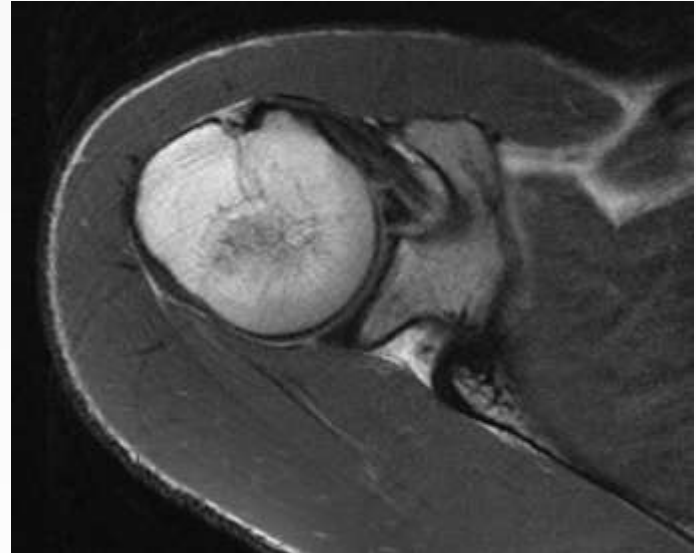
Open repair after arthroscopy

Open revision after open primary repair

Concomitant procedures (allograft
reconstruction, rotator interval closure)

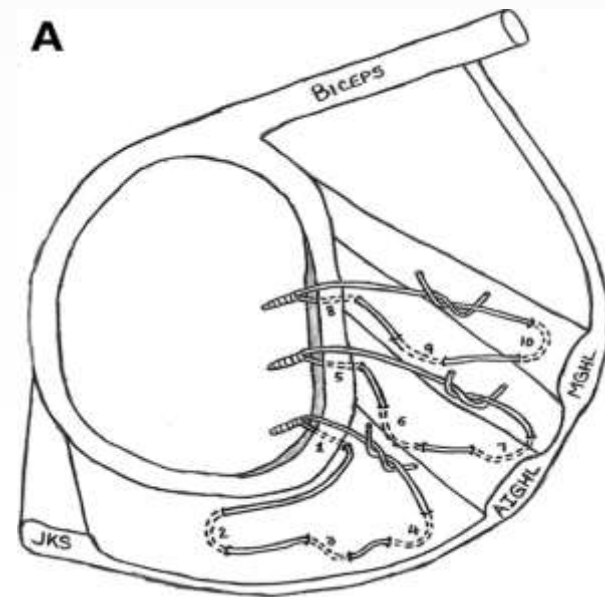
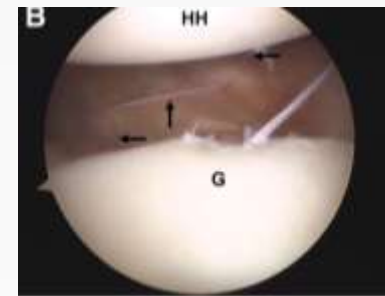
Revision arthroscopic Bankart repair

- If the primary pathology is
- recurrent Bankart lesion
 - non-anatomic Bankart repair
 - ALPSA lesion
- minimum 4 suture anchors
avoid previous suture anchors
Not interfere with cartilage



Revision arthroscopic Bankart repair & capsular shift

- inferior capsular plication for inferior laxity
- rotator interval closure for anterior laxity (Boileau et al)
- capsular shift through multiple, separate pleated plications through a single working portal (Sekiya et al)



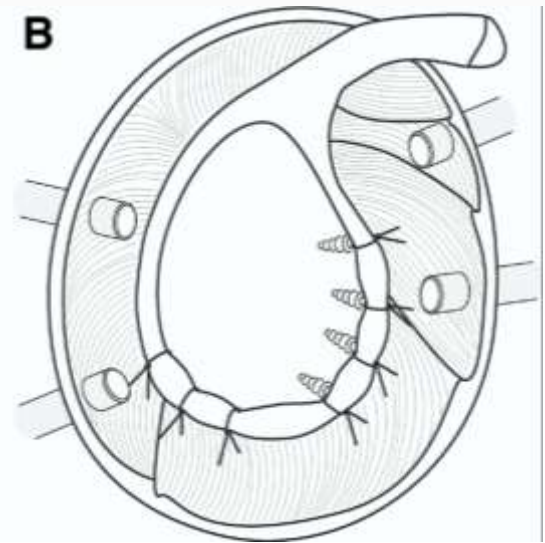
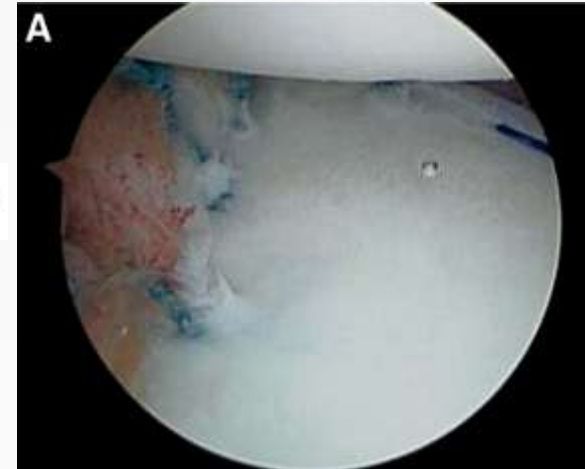
Revision Arthroscopic Shoulder Instability Repair

R. Alexander Creighton, M.D., Anthony A. Romeo, M.D.,
Fredrick M. Brown, Jr., R.N., M.S., Jennifer K. Hayden, R.N., and Nikhil N. Verma, M.D.

Arthroscopy: The Journal of Arthroscopic and Related Surgery, Vol 23, No 7 (July), 2007: pp 703-709

mean of 4.6 suture anchors
3 plication stitches
15/18 pt rotator interval closure

3 failures, 2 pt with pain and
decreased ROM



Arthroscopic Revision Bankart Repair: A Prospective Outcome Study

Seung-Ho Kim, M.D., Ph.D., Kwon-Ick Ha, M.D., Ph.D., and Young-Min Kim, M.D.

Arthroscopy: The Journal of Arthroscopic and Related Surgery, Vol 18, No 5 (May-June), 2002:

23 pt (21 male)
Index operation:
8 open Bankart &
15 arthroscopic
suture anchors, capsular plication, and
proximal shift, interval closure
15 patients had excellent results,
4 good, 3 fair, and 1 poor,
5/23 recurrence after revision surgery



Arthroscopic Capsulolabral Revision Repair for Recurrent Anterior Shoulder Instability

Christoph Bartl,^{*†} MD, Katrin Schumann,[‡] MD, Jochen Paul,[§] MD, Stephan Vogt,[§] MD, and Andreas B. Imhoff,[§] MD

Am J Sports Med 2011 39: 511

56 pt, (index op **open** in 22)
suture anchor repair (min 3)
5:30-o'clock approach
mean follow-up 37 months
Recurrent instability in 6 cases (**11%**)
Improved Rowe & Constant scores



TABLE 1
Primary Stabilization Procedure Technique

Index Stabilization Technique	No. of Patients
Open Bankart repair (anchors)	13
Open Bankart repair (transosseous)	6
Open capsular shift	3
Arthroscopic Bankart repair (anchors)	20
Arthroscopic Bankart repair (transglenoidal)	4
Arthroscopic Bankart repair (tacks)	8
Capsular plication/capsular shrinkage	2

Revision Arthroscopic Bankart Repair

Jihad Alexander Karim Abouali, M.D., Katerina Hatzantoni, M.B.B.S.,
Richard Holtby, M.D., Christian Veillette, M.D., and John Theodoropoulos, M.D.

16 studies with 349 patients

All retrospective (1 Level II & 15 Level IV)

mean follow-up period was 35.4 months

mean recurrence rate after revision Bankart: **12.7%**

most common cause for failure:

traumatic injury (62.1%),

85.1% of patients back to sports

The reasons for **failure of revision** cases included glenohumeral bone loss, hyperlaxity, and return to contact sports

Arthroscopy after open repair

The Role of Arthroscopy in Revision of Failed Open Anterior Stabilization of the Shoulder

Pascal Boileau, M.D., Julian Richou, M.D., Andrea Lisai, M.D.,
Christopher Chuinard, M.D., M.P.H., and Ryan T. Bicknell, M.D., M.Sc., F.R.C.S.(C).

Arthroscopy: The Journal of Arthroscopic and Related Surgery, Vol 25, No 10 (October), 2009:

22 patients (17 men-5 women)
bone block (16 cases), open Bankart (3 cases),
and capsular shift (2 cases)
1 recurrent subluxation

TABLE 3. Arthroscopic Revision Procedures

Arthroscopic Procedures	No. of Patients	%
Labrum reattachment	22	100
Inferior capsular plication	12	54
Rotator interval closure	4	18
Screw removal	8	50
Other		
SLAP resection	2	9
Cuff repair	1	4.5
Biceps tenotomy	1	4.5



Open revision after primary arthroscopic repair

Revision of Failed Arthroscopic Bankart Repairs

Domenick J. Sisto,* MD

From the Los Angeles Orthopaedic Institute, Sherman Oaks, California

The American Journal of Sports Medicine, Vol. 35, No. 4

DOI: 10.1177/0363546506296520

© 2007 American Orthopaedic Society for Sports Medicine

30 pt (28 male)
mean age 24 years
excellent (6.7%), good (80%), fair (13.3%)

Possible risk factors:

- inadequate postop immobilization,
- large rotator intervals,
- improper anchor placement

TABLE 1
Arthroscopic Findings^a

Finding	N (%)
Bankart lesion	26 (87)
ALPSA	4 (13)
Bony Bankart	0
Hill-Sachs (nonengaging)	24 (80)
Hill-Sachs (engaging)	0
SLAP lesion type I	4 (13)
SLAP lesion type II	0
Subscapularis tendon tear (partial)	1 (3)
Biceps tear (partial)	0
HAGL	0
Rotator interval abnormality	10 (33)
Rotator cuff tear (partial)	2 (7)
Rotator cuff tear (full thickness)	0
Loose bodies	10 (33)
Synovitis	10 (33)

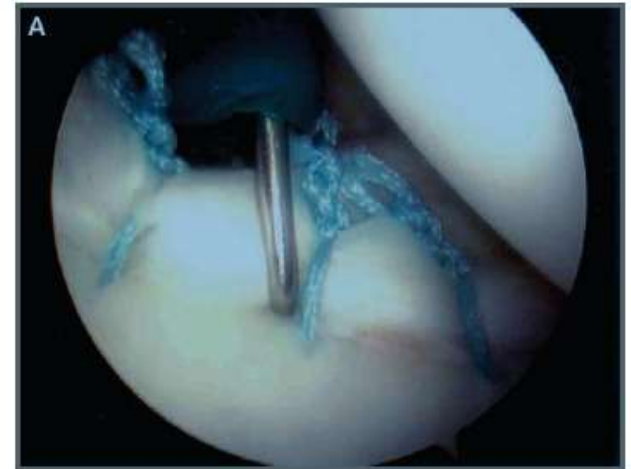
Revision Open Bankart Surgery After Arthroscopic Repair for Traumatic Anterior Shoulder Instability

The American Journal of Sports Medicine, Vol. 37, No. 11
DOI: 10.1177/0363546509339015
© 2009 The Author(s)

Nam Su Cho,* MD, Jin Woong Yi,[†] MD, Bong Gun Lee,^{*‡} MD, and Yong Girl Rhee,^{*‡} MD

26 pt, mean age 24 years
follow-up was 42 months
mean Rowe score was 81 points,
88.5% good or excellent results
redislocation in 3 shoulders (11.5%)

88.3% re-tear of the Bankart lesion

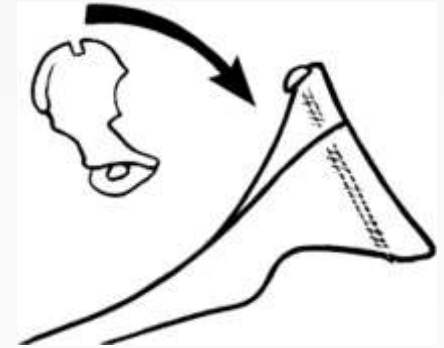


Open revision after primary open repair

**Recurrent anterior dislocation after the Latarjet procedure:
Outcome after revision using a modified Eden-Hybinette
operation**

(J Shoulder Elbow Surg 2008;17:744-750.)

John V. Lunn, FRCSI, (Tr & Orth), Juan Castellano-Rosa, MD, and Gilles Walch, MD, Lyon, France



prevented recurrence in 88% of pt
94% of patients to return to sports
80% good or excellent result
Arthritis in 4 (14%)

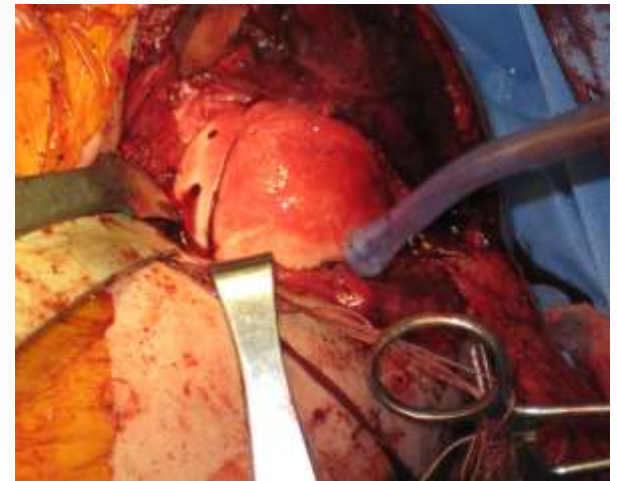
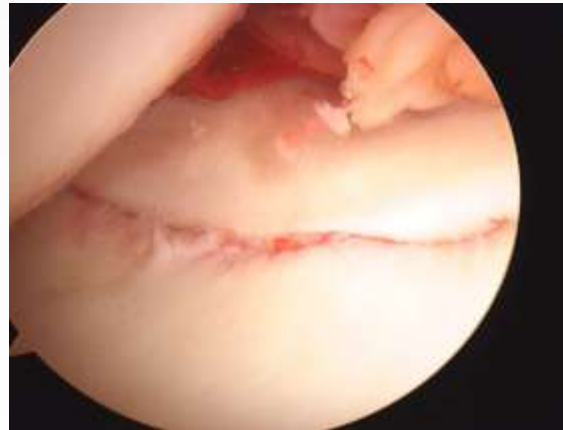


Allograft reconstruction for large bony defects

Current Concepts With Video Illustration

Failure of Operative Treatment for Glenohumeral Instability:
Etiology and Management

Apurva S. Shah, M.D., M.B.A., Mark S. Karadsheh, M.D., and Jon K. Sekiya, M.D.



Conclusions

Failure of primary instability procedures is often related to uncorrected anatomic pathology

Identify patients at higher risk (ISIS)

Address excessive capsular laxity or large glenohumeral bone defects

Precise and anatomical surgical technique

Always diagnostic arthroscopy

Results of revision after failed surgical treatment for traumatic anterior shoulder instability☆

Y. López-Morales*, J. Alcobé-Bonilla, C. García-Fernández, A. Francés-Borrego, R. Otero-Fernández, F. Marco-Martínez

Rev Esp Cir Ortop Traumatol. 2013;57(3):208-216

Results of revision after failed surgical treatment for traumatic anterior shoulder instability

