Precourse 11: Arthroscopic Management of Carpal Instability

Co-Chairs: David J. Slutsky, MD and Guillaume Herzberg, MD, PhD

Program Syllabus

Thursday, September 05, 2019

74TH ANNUAL MEETING OF THE ASSH
SEPTEMBER 5 – 7, 2019
LAS VEGAS, NV

822 West Washington Blvd
Chicago, IL 60607
Phone: (312) 880-1900
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Precourse 11: Arthroscopic Management of Carpal Instability

Wrist Arthroscopy continues to grow and evolve with new and exciting techniques arising from a variety of innovators on every continent. This pre-course will discuss the role of arthroscopy in the diagnosis of carpal instability by leading experts from North America, Europe, Asia and Australia. Arthroscopy has become the gold standard in the staging of both scapholunate and lunotriquetral instability and has revolutionized the treatment. Arthroscopy may be used as the preferred method of treatment or as an adjunct to an open procedure.

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LEARNING OBJECTIVES

At the conclusion of this program, the attendee will:

- Identify recent innovations and emerging concepts of scapholunate reconstruction, lunotriquetral ligament repairs midcarpal instability and perilunate injuries.
- Understand the classification of carpal instability and the relative pathoanatomy and biomechanical changes.
- Compare newer techniques for the treatment of myriad of carpal instabilities.

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Precourse 11: Arthroscopic Management of Carpal Instability

Thurssday, September 05, 2019 – 7:00 AM – 11:00 AM

Neopolitan Ballroom III/IV, Caesars Palace Las Vegas

Co-Chairs: David J. Slutsky, MD and Guillaume Herzberg, MD, PhD

Description
Wrist Arthroscopy continues to grow and evolve with new and exciting techniques arising from a variety of innovators on every continent. This pre-course will discuss the role of arthroscopy in the diagnosis of carpal instability by leading experts from North America, Europe, Asia and Australia. Arthroscopy has become the gold standard in the staging of both scapholunate and lunotriquetral instability and has revolutionized the treatment. Arthroscopy may be used as the preferred method of treatment or as an adjunct to an open procedure.

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- Compare newer techniques for the treatment of myriad of carpal instabilities.

PROGRAM

Session Chair(s)
David J. Slutsky, MD | Guillaume Herzberg, MD, PhD

7:00 AM - 9:20 AM
Session 1: Scapholunate Instability
David J. Slutsky, MD | Guillaume Herzberg, MD, PhD

7:00 AM - 7:10 AM
SL Instability: Diagnosis and Grading
William B. Geissler, MD

7:10 AM - 7:20 AM
Arthroscopic gap measurement for SL Instability
Shohei Omokawa, MD

7:20 AM - 7:30 AM
Association of the Geissler grade following ligament sectioning
Steve K. Lee, MD

7:30 AM - 7:40 AM
Arthroscopic Pinning for SL Instability
A. Lee Osterman, MD

7:40 AM - 7:50 AM
Arthroscopic treatment for grade 1 and 2 SL instability
David S. Ruch, MD

7:50 AM - 8:00 AM
Arthroscopic treatment for grades 3 and 4 SL instability
Dean G. Sotereanos, MD

8:00 AM - 8:10 AM
Associated Lesions with SL Instability
Randall W. Culp, MD

8:10 AM - 8:20 AM
Arthroscopic Corelli SL ligament reconstruction
Nicholas Charles Smith, MD

8:20 AM - 8:30 AM
Arthroscopic RASL
Michael R. Hausman, MD

8:30 AM - 8:40 AM
Imaging and anatomical considerations for RADICL repair
Scott W. Wolfe, MD

8:40 AM - 8:50 AM
Arthroscopic repair of DIC ligament
Ubaldo Ayala, MD

8:50 AM - 9:00 AM
Arthroscopic Wrist Debridement and Radial Styloidectomy for SLAC wrist
Melvin P. Rosenwasser, MD

9:00 AM - 9:10 AM
Arthroscopic Resection for Advanced SLAC Wrist
Tyson K. Cobb, MD

9:10 AM - 9:20 AM
Arthroscopic arthrodesis for SLAC wrist
Francisco del Piñal, MD

9:20 AM - 10:40 AM
Session 2: Lunotriquetral Instability
David J. Slutsky, MD | Guillaume Herzberg, MD, PhD

9:20 AM - 9:30 AM
LT Instability: Diagnosis and Grading
Toshiyasu Nakamura, MD, PhD

9:30 AM - 9:40 AM
The Floating Lunate
Alejandro Badia, MD

9:40 AM - 9:50 AM
Arthroscopic Tx vs. Graft for gr IV LT instability
Jan-Ragnar Haugstvedt, MD

9:50 AM - 10:00 AM
Role of Arthroscopy for Radiocarpal Dislocation
David J. Slutsky, MD

10:00 AM - 10:10 AM
Arthroscopy for Lunate Fractures with Radiocarpal and Midcarpal Instabilities
Gregory I. Bain, FRACS, PhD

10:10 AM - 10:20 AM
Arthroscopic Treatment of PLD and PLFD
Bo Liu, MD

10:20 AM - 10:30 AM
Arthroscopic Treatment of Perilunate Injuries
Guillaume Herzberg, MD, PhD

10:30 AM - 10:40 AM
Arthroscopic DRCL repairs
Mark Ross, FRACS

10:40 AM - 11:00 AM
Session 3: Midcarpal Instability
David J. Slutsky, MD | Guillaume Herzberg, MD, PhD

10:40 AM - 10:50 AM
Arhroscopy and MCI
Randip R. Bindra, FRCS, MCh Orth

10:50 AM - 11:00 AM
Role of Arthroscopy in treatment of Palmar Midcarpal Instability
Pak-cheong Ho, MD

Precourse 11: Arthroscopic Management of Carpal Instability
7:00 AM - 7:10 AM

SL Instability: Diagnosis and Grading

William B. Geissler, MD

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Speaker has not provided a handout for this presentation

Precourse 11: Arthroscopic Management of Carpal Instability
7:10 AM - 7:20 AM

Arthroscopic gap measurement for SL Instability

Shohei Omokawa, MD
No relevant conflicts of interest to disclose

Arthroscopic Gap Measurement for Scapholunate Instability

Shohei Omokawa MD. PhD.

Department of Hand Surgery
Nara Medical University, Japan

Pre-Course 11: Arthroscopic Management of Carpal Instability
Thursday, September 5, 2019, 7:10 AM - 7:20 AM

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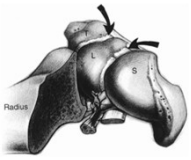
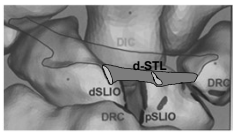
SL joint Stabilizer

Primary	Secondary
■ SLIOL (Dorsal, Proximal, Palmar)	■ DIC (dorsal intercarpal) ■ ST (scaphotrapezial) ■ LRL (long radiolunate)





- Berger RA J. Hand Surg, 1996
- Nanno M, Viegas SF: Hand Surgery Update 4

2

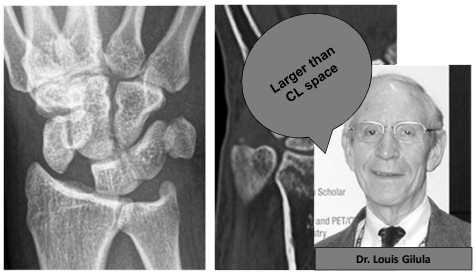
Analysis of Carpal Instability
- Scapholunate (SL) Instability -

Category Ⅰ	Category Ⅱ	Category Ⅲ	Category Ⅳ	Category Ⅴ
Chronicity	Constancy	Etiology	Direction	Pattern
➢ Acute(<1w) ➢ Subacute (1-6w) ➢ Chronic (>6w)	➢ Pre-dynamic ➢ Dynamic ➢ Static	➢ Traumatic ➢ Congenital ➢ Inflammatory ➢ Neoplastic ➢ Iatrogenic	➢ DISI ➢ VISI ➢ Ulnar ➢ Vertical ➢ Combined	➢ CID ➢ CIND ➢ CIC ➢ CIA

- Larsen CF, Amadio PC, Gilula LA, et al: JHS-am 1995
- Watson H, et al: JHS-Br, 1993

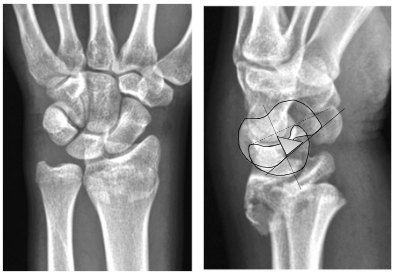
3

Static SL instability
SL widening in PA view (larger than 3㎜)



4

Static SL instability
SL mal-rotation in Lat view (SL angle > 60°)



5

Dynamic SL instability
Stress view

6

Staging Dependent Treatment for SLD

Staging of Scapholunate Dissociations

SLD Stage	1	2	3	4	5	6
Is there a partial rupture with a normal dorsal SL ligament?	Yes	No	No	No	No	No
If ruptured, can the dorsal SL ligament be repaired?	Yes	Yes	No	No	No	No
Is the scaphoid normally aligned (radioscaphoid angle ≤ 45°)?	Yes	Yes	Yes	No	No	No
Is the carpal malalignment easily reducible?	Yes	Yes	Yes	Yes	No	No
Are the cartilages at both RC and MC joints normal?	Yes	Yes	Yes	Yes	Yes	No

Repair & Capsulodesis
Stage 1,2 (Acute)

B-L-B Reconstruction
Stage 3 (Chronic)

Three Ligament Tenodesis (3LT)
Stage 4 (Chronic)

- Garcia-Elias M et al: J Hand Surg 2006.
- Luchetti R, Azei A: J Wrist Surg 2013.

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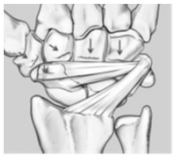
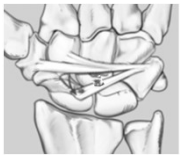
Dorsal Ligament Capsulodesis

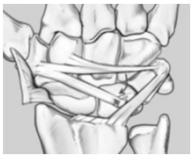
- Stage 1 (Acute & Chronic)
- Stage 2 (Acute & Chronic)



Szabo RM: JHS, 2008



Viegas SF: JHS, 1999



Moran SL: JHS, 2006

8

My Preferred Modification

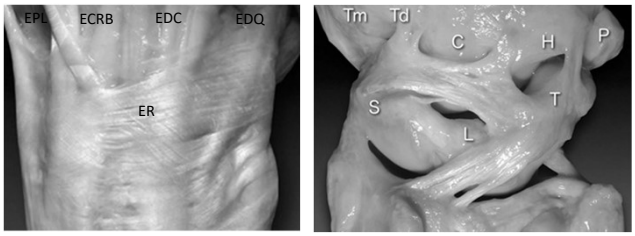
Acute & Chronic SLD (Stage 1,2)

Transfer in bi-pedicled fashion

- Healthy Cartilage
- Normal Alignment
- Available Remnant of Ligament (Stage 3,4)

9

Dorsal Wrist Soft Tissue Structures



- Courtesy of Dr Tamai M

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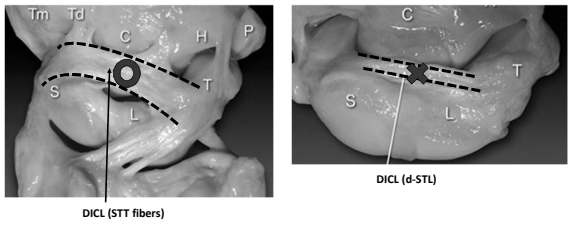
Dorsal Intercarpal Ligament Tears associated with SLD



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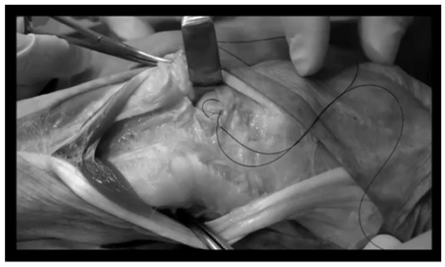
Bi-pedicled Dorsal Ligament Capsulodesis



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51Y-F: Chronic, Static, Reducible, Cartilage Healthy (stage 4)

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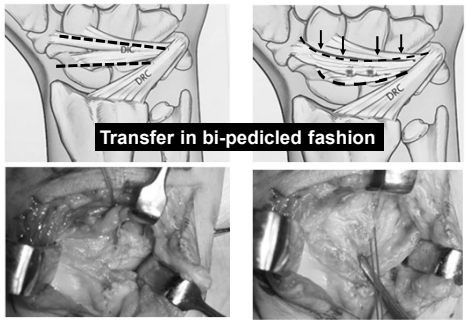
Bipedicled Dorsal Ligament Capsulodesis



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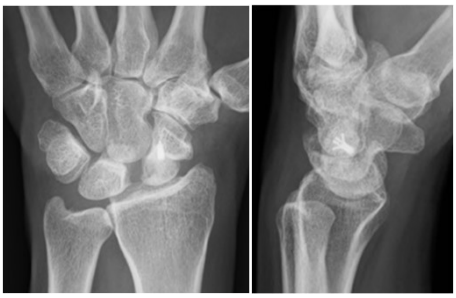
Temporary Screw Fixation for 3 months

15

5Y Post-op



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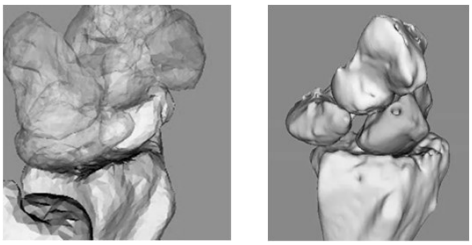
Pre-op (painful) **5Y Post-op (painless)**

17

Why painless despite the postop-SLD?

Pre-op **Post-op**



Courtesy of Osaka University Hand Team

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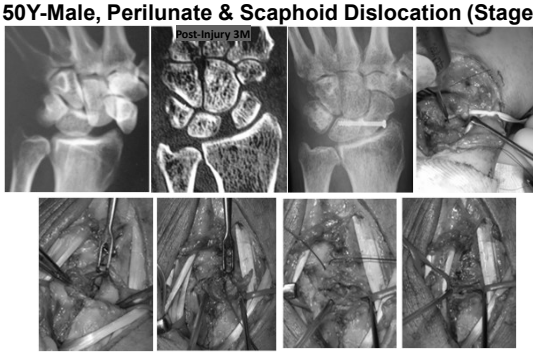
50Y-Male, Perilunate & Scaphoid Dislocation (Stage 4)



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Postop 11Y Functional Outcomes

- DASH: 12 PRWE: 8
- GS: L32/R24
- PP: L8.6/R8.8

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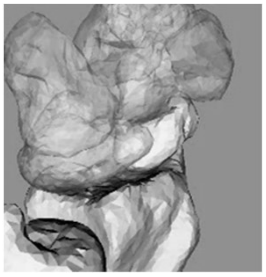
Dorsal scaphoid subluxation based on dynamic-CT



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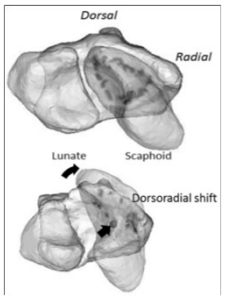
Lateral wrist X-ray is more important than PA view



- Omori, Moritomo, Omokawa et al: JHS 2013

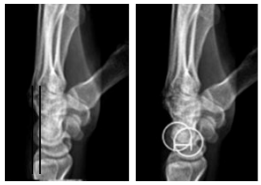
22

Dorsal Scaphoid Subluxation correlate with Wrist pain & Disability (PRWE)

	SLIL	Controls	*p*-Value
SL gap	4.1 mm (±1.4)	2.0 mm (±0.5)	$p < 0.001$
SL angle	76.7° (±11.2)	50.2° (±9.5)	$p < 0.001$
RL angle	14.4° (±10.4)	8.9° (±4.0)	$p = 0.035$
RS angle	63.0° (±8.7)	50.0° (±11.4)	$p < 0.001$

	SLIL	Controls	*p*-Value
Concentric circles	2.9 mm (±1.7)	0.9 mm (±1.1)	$p < 0.001$
DTL distance	2.5 mm (±1.9)	0.6 mm (±1.2)	$p < 0.001$
DTL	15/20 dorsal	4/20 dorsal	$p < 0.001$

DTL: Dorsal Tangential Line



- Chan K, Vutescu E, Wolfe Scott et al: IWIW 2018, JWS 2019

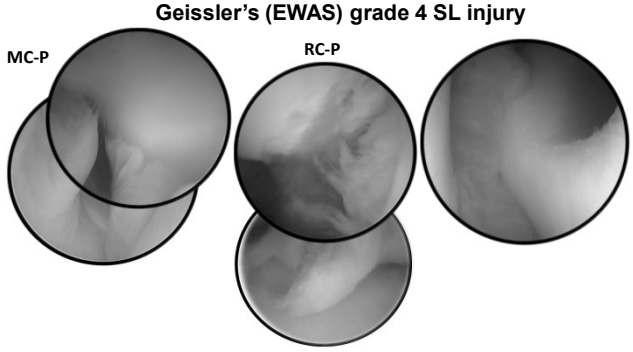
23

18yo Male Rugby player (6M post injury)

2.8mm SL gap in grip view

24

Geissler's (EWAS) grade 4 SL injury



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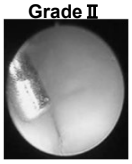
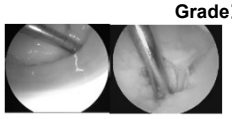
Arthroscopic EWAS Grading

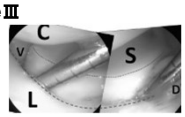
Grade Ⅱ



Grade Ⅲ



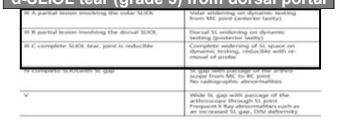
ⅢA ⅢB



ⅢC

Grade Ⅳ

Difficult to observe directly d-SLIOL tear (grade 3) from dorsal portal



- Jane C et al: J Wrist Surg, 2013

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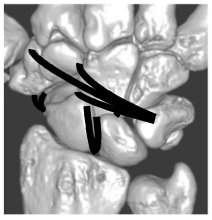
Arthroscopic Gap Measurement for SL Instability

Sequential ligament sectioning



SLIOL
DICL (dSTL)
STL

SL gap measurement

- Custom-made probes in diameter of 1.0, 1.2, 1.5, 1.8, 2.0, 3.0, 4.0, 5.0, 6.0 mm

- Dohi Y, Omokawa S, et al, J Orthop Sci, 2012.

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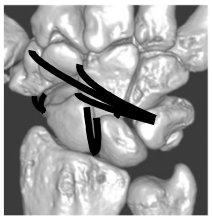
Arthroscopic Gap Measurement for SL Instability

Sequential ligament sectioning



SLIOL
DICL (d-STL)
STL

Staging

Stage 0: intact
Stage 1: v,p-SLIOL
Stage 2: d-SLIOL
Stage 3: partial d-STL
Stage 4: complete d-STL
Stage 5: STL

- SLIOL: scapholunate interosseous ligament
- d-STL:dorsal scaphotriquetral ligament
- STL: scaphotrapezial ligament

- Dohi Y, Omokawa S, et al, J Orthop Sci, 2012.

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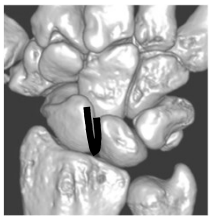
Arthroscopic Gap Measurement for SL Instability

Sequential ligament sectioning

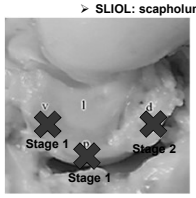


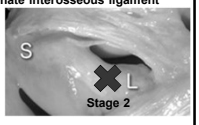
SLIOL
DICL (d-STL)
STL

Staging

Stage 1: v,p-SLIOL
Stage 2: d-SLIOL

- SLIOL: scapholunate interosseous ligament





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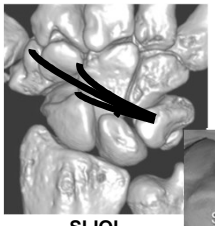
Arthroscopic Gap Measurement for SL Instability

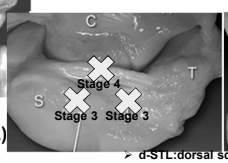
Sequential ligament sectioning

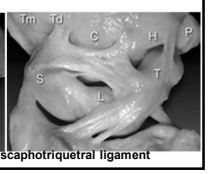


SLIOL
DICL (d-STL)
STL

Staging

Stage 3: partial d-STL
Stage 4: complete d-STL





- d-STL:dorsal scaphotriquetral ligament

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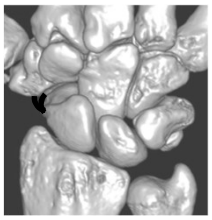
Arthroscopic Gap Measurement for SL Instability

Sequential ligament sectioning



SLIOL
DICL (d-STL)
STL

Staging

Stage 5: STL

- STL: scaphotrapezial ligament

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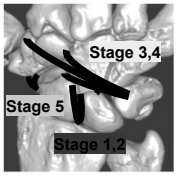
Results

	Static SL gap	Dynamic SL gap	
Stage 0	0.0±0.0	0.3±0.6	
Stage 1	0.0±0.0	0.4±0.8	
Stage 2	0.5±0.6	2.2±1.2 *	P<0.01
Stage 3	0.5±0.6	2.7±1.4 *	
Stage 4	1.3±0.8	4.1±2.0 *	
Stage 5	1.4±0.9	4.8±1.5 *	



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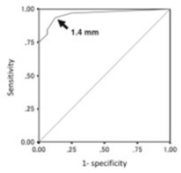
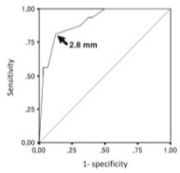
Results

AUC and Dynamic SL gap cut-off value
-identifying SLIOL & d-STL tear-



- AUC: 0.94 for complete SLIOL tear
- 1.4 mm gap showed 91% accuracy



- AUC: 0.90 for complete d-STL (DICL) tear
- 2.8 mm gap showed 85% accuracy

AUC (Area under the curve)

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Summary

- **SL gap distance in static SL instability shows >3mm neutral PA view wrist X-ray (>CL joint space)**
- **SL angle in static SL instability shows >60 degrees in neutral lateral view wrist X-ray**
- **Dynamic SL instability reveals carpal malalignment in stress (grip view) and dynamic X-ray**
- **Dorsal scaphoid subluxation (>2mm) relative to radius (lateral view) contribute to wrist symptom**
- **Arthroscopic measurement of dynamic SL gap distance may identify complete SLIOL (1.4mm) and d-STL (2.8mm) tears**

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Precourse 11: Arthroscopic Management of Carpal Instability
7:20 AM - 7:30 AM

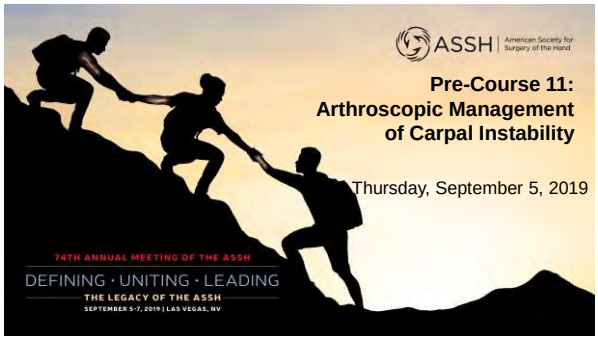
Association of the Geissler grade following ligament sectioning

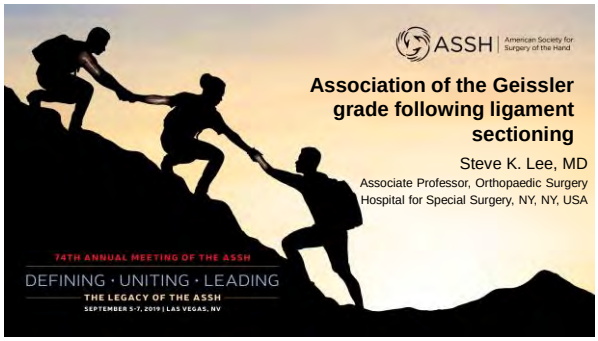
Steve K. Lee, MD

- Royalty: Arthrex
- Receipt of Intellectual Property Rights: Arthrex
- Consulting Fee: Synthes, Axogen, Zimmer Biomet
- Speakers Bureau: Axogen

ASSH
American Society for Surgery of the Hand

74TH ANNUAL MEETING OF THE ASSH
SEPTEMBER 5 - 7, 2019 LAS VEGAS, NV





Disclosures

74TH ANNUAL MEETING OF THE ASSH
DEFINING · UNITING · LEADING
THE LEGACY OF THE ASSH

- **Consultant: Axogen, J&J Depuy Synthes, Zimmer Biomet**
- **Speaker's panel: Axogen, J&J Depuy Synthes**

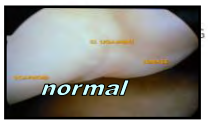
Introduction

- The scapholunate ligament is the most common intra-carpal ligament injured
- Diagnosis of these injuries can be made by clinical examination, imaging studies and arthroscopic evaluation

- Geissler published an arthroscopic classification to describe and grade the severity of scapholunate injuries (Geissler JBJS 1996)
- Commonly used in the literature and practice

GRADE	DESCRIPTION
I	Attenuation, hemorrhage
II	Slight gap, < probe
III	Pass probe
IV	"Drive through"

From Geissler et al., JBJS, 1996



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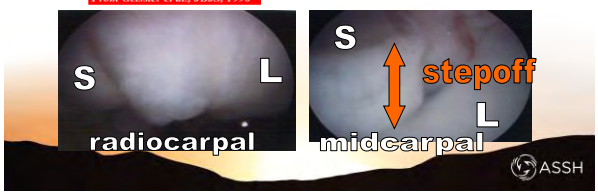

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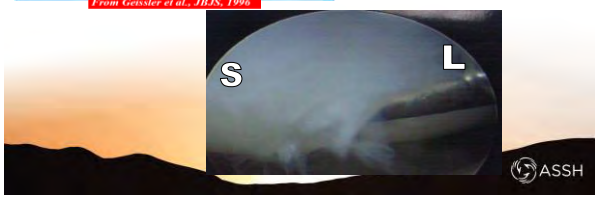

GRADE	DESCRIPTION
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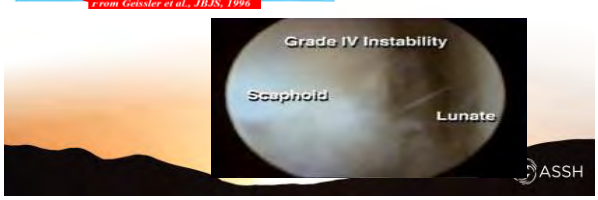

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- **Treatment algorithms have been based on this classification system**
  - **Abe et al. JHS Br 2006**
  - **Earp et al. JBJS 2006**
  - **O' Meeghan et al. JHS Br 2006**
  - **Piecha et al. KSSTA 1999**

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2015

SCIENTIFIC ARTICLE

Association of Lesions of the Scapholunate Interval With Arthroscopic Grading of Scapholunate Instability Via the Geissler Classification

Steve K. Lee, MD, Zina Model, BA, Healthy Desai, MD, Patricia Hsu, MD, Nader Paksima, DO, MPH, Gurpreet Dhaliwal, MD

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Purpose

- **The purpose of this study was to determine if specific anatomic lesions of the scapholunate supporting structures correlate with different grades of the Geissler classification**

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Materials & Methods

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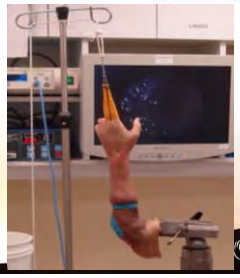
Standard wrist arthroscopy was performed



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- **The scapholunate supporting ligaments were then serially sectioned using both arthroscopic and open techniques**
- **The appearance of the scapholunate interval from both radiocarpal and midcarpal joints was recorded following each sectioning**

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- **Ligaments were sectioned in the following order:**
  - **vSLIL**
  - **mSLIL**
  - **dSLIL**
  - **RSC**
  - **LRL**
  - **DRC**
  - **DIC**
  - **STT** ***(based on Short and Mayfield)***

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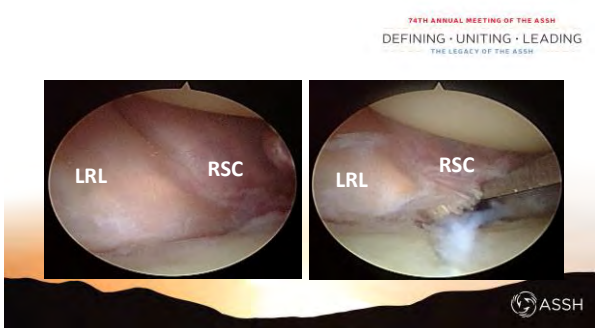
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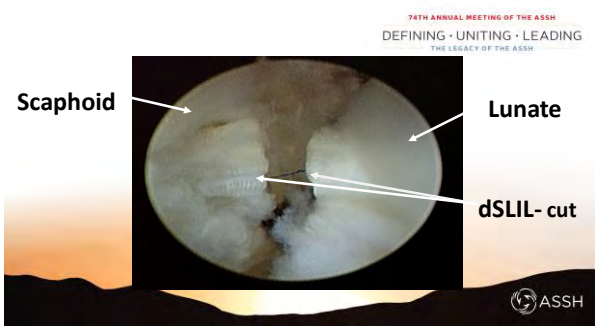
LRL
RSC
LRL
RSC
ASSH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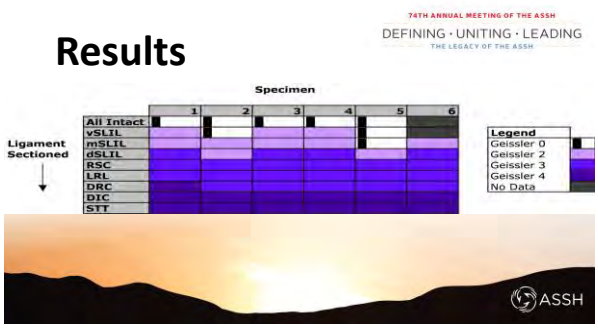
Scaphoid
Lunate
dSLIL- cut
ASSH

Results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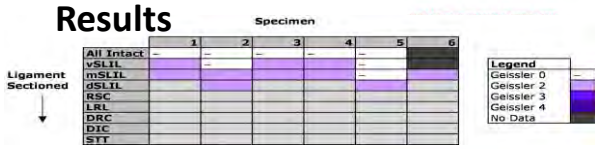
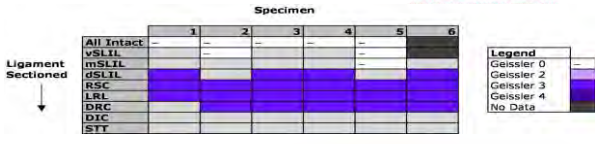
Specimen
1
2
3
4
5
6
Ligament Sectioned
All Intact
vSLIL
mSLIL
dSLIL
RSC
LRL
DRC
DIC
STT
Legend
Geissler 0
Geissler 2
Geissler 3
Geissler 4
No Data
ASSH

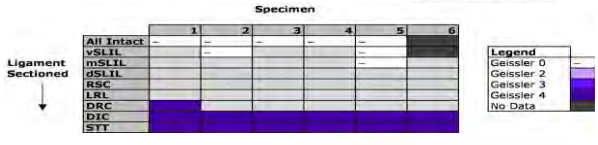
Results



- Geissler grade 2 injuries occurred with lesions of the intrinsic ligaments only
- Most commonly involved only volar and membranous portions of the SLIL



- Geissler grade 3 injuries usually first occurred with lesions of the dorsal SLIL
- Lesions through the volar extrinsic wrist ligaments continued to be represented as a Geissler grade 3 injury



- Geissler grade 4 injuries most commonly did not occur until the DIC was sectioned

Discussion

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- The Geissler grade progressively increased with sequential sectioning of the scapholunate supporting ligaments
- Lesions of the dorsal SLIL (Geissler 3) and the DIC (Geissler 4) represented key transition points with regards to progression through the Geissler grades

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Conclusion

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- In a cadaveric model the arthroscopically determined Geissler grade can be correlated with specific anatomic lesions of the scapholunate supporting ligaments

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Conclusion

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- Geissler grade 2: SLIL, volar and membranous portions
- Geissler grade 3: dorsal SLIL through RSC, LRL
- Geissler grade 4: DIC, STT

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Conclusion

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- This information could help guide treatment after arthroscopic evaluation

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References

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- Mayfield JK, Johnson RP, Kilcoyne RK. Carpal dislocations: pathomechanics and progressive perilunar instability. J Hand Surg Am. 1980;5(3):226e241.
- Short WH, Werner FW, Green JK, Masaoka S. Biomechanical evaluation of ligamentous stabilizers of the scaphoid and lunate. J Hand Surg Am. 2002;27(6):991e1002.

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Precourse 11: Arthroscopic Management of Carpal Instability
7:30 AM - 7:40 AM

Arthroscopic Pinning for SL Instability

A. Lee Osterman, MD

- Royalty: Globus Medical
- Consulting Fee: Globus Medical, Acumed, AxoGen
- Speakers Bureau: Depuy Synthes
- Contracted Research: AxoGen, Acumed

Speaker has not provided a handout for this presentation

Precourse 11: Arthroscopic Management of Carpal Instability
7:40 AM - 7:50 AM

Arthroscopic treatment for grade 1 and 2 SL instability

David S. Ruch, MD

- Royalty: Elsevier textbooks
- Receipt of Intellectual Property Rights: Multiple tissue engineering patents
- Consulting Fee: ReSurge International

Speaker has not provided a handout for this presentation

Precourse 11: Arthroscopic Management of Carpal Instability
7:50 AM - 8:00 AM

Arthroscopic treatment for grades 3 and 4 SL instability

Dean G. Sotereanos, MD
● Consulting Fee: Arthrex Smith & Nephew Axogen Inc

Arthroscopic Treatment for grades 3 & 4 SL Instability

Dean G. Sotereanos, MD

Clinical Professor of Orthopaedic Surgery
University of Pittsburgh School of Medicine
Orthopaedic Specialists - UPMC
Pittsburgh, PA, USA

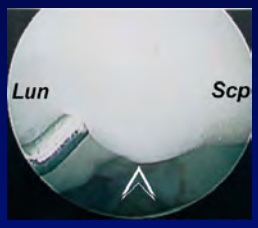
Disclosures:
consultant for Arthrex, Axogen Inc, Smith & Nephew

Scapholunate Interosseous Ligament Injuries

- *Most common/significant wrist ligament injury*
- *Wide spectrum of injuries*
- *Diagnostic and treatment dilemma*

Geissler's Classification

Grade I



Occult Instability

redundancy / V sign

Geissler's Classification

Grade II

Pre-Dynamic Instability

partial tear (proximal/membranous portion)
minimal gapping

Geissler's Classification

Grade III

Dynamic Instability

incongruence / gapping

Geissler's Classification

Grade IV

Static Instability

gross instability
dissociation

Treatment of SLIL Tears

based on:

- Severity of symptoms
- Degree of instability

  (predynamic, dynamic or static)
- Chronicity (acute, subacute, or chronic)
- Arthroscopic findings (Geissler grade I-IV)

Treatment of SLIL Tears

No consensus on the appropriate treatment

Nonsurgical — Surgical treatment

I II III IV

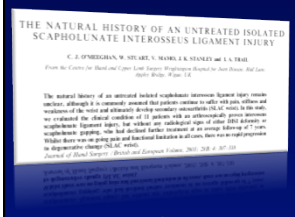
Arthroscopic vs. Open
Debridement/Shrinkage ?
Pinning ?
Capsulodesis ?
Reconstruction ?
Fusion ?

Treatment of Partial SLIL Tears

- *Partial tears: grade II – III*
- *Treatment dilemma*
- *Described by Watson et al. (1997) as the* ***"dorsal wrist syndrome"***
- *One of the main causes of dorsal wrist pain*

Treatment of Partial SLIL Tears

Should we repair them?


THE NATURAL HISTORY OF AN UNTREATED ISOLATED SCAPHOLUNATE INTEROSSEUS LIGAMENT INJURY

- *no radiographic signs of instability at 7 year f-up of untreated partial tears but…*
  - *Persistent pain*
  - *Limited ROM*
  - *Functional limitations*

O'Meeghan Cj, Stuart W, Mamo V, Stanley JK, Trail IA. JHS 2003

Partial SLIL Tears

Arthroscopic debridement

↓

provides pain relief

stabilizing effect of scar tissue formation

partial denervation of the wrist

Geissler III & IV SLIL tears

arthroscopic debridement

&

percutaneous pinning

Arthroscopic Reduction and Percutaneous Pinning

GROUP I

symptoms <3 m

SL interval <3 mm

- *83% of the pts were symptom-free*

GROUP II

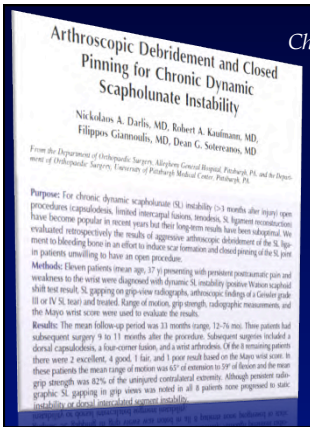
symptoms >3 m

SL interval >3 mm

- *53% of the pts were symptom-free*

Chronicity and static instability are negative prognostic factors

Whipple TL. Hand Clin 1995


Arthroscopic Debridement and Closed Pinning for Chronic Dynamic Scapholunate Instability

Nickolaos A. Darlis, MD, Robert A. Kaufmann, MD, Filippos Giannoulis, MD, Dean G. Sotereanos, MD

From the Department of Orthopaedic Surgery, Allegheny General Hospital, Pittsburgh, PA, and the Department of Orthopaedic Surgery, University of Pittsburgh Medical Center, Pittsburgh, PA

Purpose: For chronic dynamic scapholunate (SL) instability (>3 months after injury) open procedures (capsulodesis, limited intercarpal fusions, tenodesis, SL ligament reconstruction) have become popular in recent years but their long-term results have been suboptimal. We evaluated retrospectively the results of aggressive arthroscopic debridement of the SL ligament to bleeding bone in an effort to induce scar formation and closed pinning of the SL joint in patients unwilling to have an open procedure.

Methods: Eleven patients (mean age, 37 y) presenting with persistent posttraumatic pain and weakness to the wrist were diagnosed with dynamic SL instability (positive Watson scaphoid shift test result; SL gapping on grip-view radiographs, arthroscopic findings of a Geissler grade III or IV SL tear) and treated. Range of motion, grip strength, radiographic measurements, and the Mayo wrist score were used to evaluate the results.

Results: The mean follow-up period was 33 months (range, 12–76 mo). Three patients had subsequent surgery 9 to 11 months after the procedure. Subsequent surgeries included a dorsal capsulodesis, a four-corner fusion, and a wrist arthrodesis. Of the 8 remaining patients there were 2 excellent, 4 good, 1 fair, and 1 poor result based on the Mayo wrist score. In these patients the mean range of motion was 65° of extension to 59° of flexion and the mean grip strength was 82% of the uninjured contralateral extremity. Although persistent radiographic SL gapping in grip views was noted in all 8 patients none progressed to static instability or dorsal intercalated segment instability.

Chronic dynamic SLIL tears

"evaluation of aggressive arthroscopic debridement of the SLIL and closed pinning"

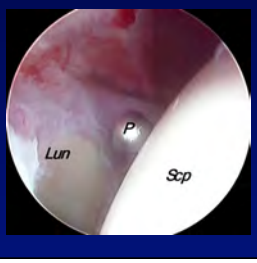
JHS Am 2006

Material

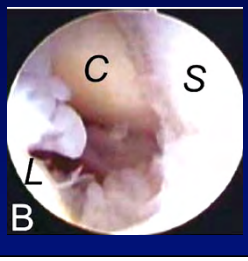
- *11 pts mean age 37 y (range 23-50 y)*
- *Chronic Dynamic S-L Instability*
- *Pain with loading of the wrist and weakness*
- *Time from injury to surgery - 7 m*

Arthroscopic findings

Geissler III: 5



Geissler IV: 6



Technique

Aggressive Arthroscopic Debridement
- *Removal of all residual SLIL*
- *Removal of SL interval cartilage to bleeding bone*

Closed Pinning under Fluoroscopy
- *2 K/W to SL joint*
- *1 or 2 K/W to SC joint*

Results

- *Mean follow-up 33 m (12-76 m)*
- *Functional outcome (Modified Mayo Wrist Score):*
  excellent: 2, good: 4, fair: 1, poor: 4
- *3 failures => re-operated (capsulodesis/arthrodesis)*

Results

Geissler Grade III vs IV tears:

- *younger age at presentation*
- *better final:* *- wrist scores*
  - ROM
  - grip strength

BUT

None of these differences reached statistical significance

Arthroscopic Debridement and Percutaneous Pinning

Conclusions

- ***Geissler Grade III tears***
  May be a better indication for this procedure
- *An option for pts who:*
  - require maintenance of wrist motion
  - do not desire an open procedure

Darlis NA, Kaufmann RA, Giannoulis F, Sotereanos DG. JHS Am 2006

Material

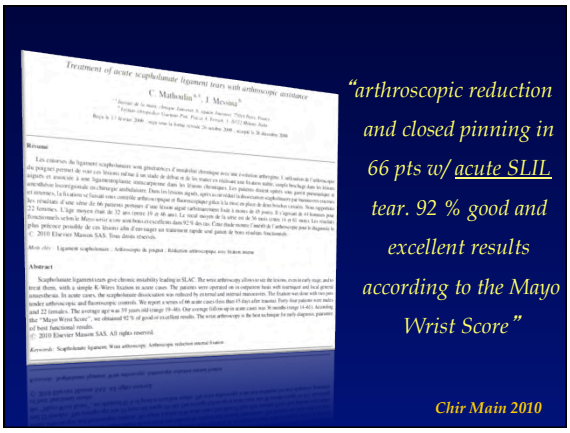
- *42 pts mean age 32 y (range 19-57 y)*
- *Geissler III: 30 & Geissler IV: 12*
- *Chronic Dynamic S-L Instability*
- *Time from injury to surgery - 9 m (4-14 m)*

Results

- *Mean follow-up 68 m (minimum 60 m)*
- *All pts clinical improvement*
- *Modified Mayo Wrist Score:*

  mean pre-op: 62 post-op: 88
- *No DISI*

Kim LK, Lee SL, Kang SH, Park JS, Park J, Kim GL. JHS Eur 2019



"arthroscopic reduction and closed pinning in 66 pts w/ acute SLIL tear. 92 % good and excellent results according to the Mayo Wrist Score"

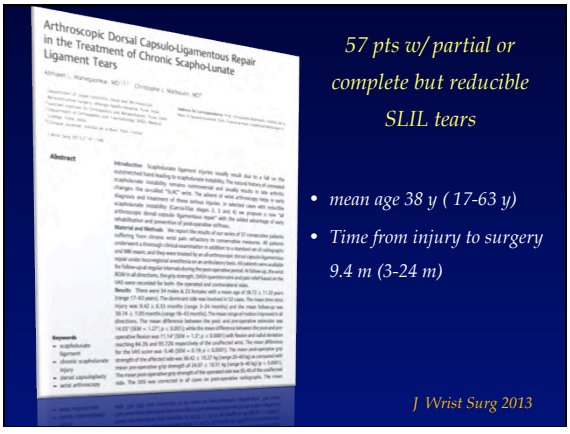
***Chir Main* 2010**

Geissler III & IV SLIL tears

arthroscopic

dorsal capsuloligamentous

SL ligament repair

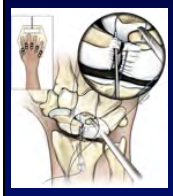
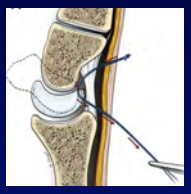
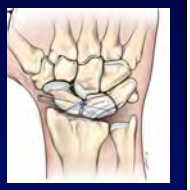


57 pts w/ partial or complete but reducible SLIL tears

- *mean age 38 y (17-63 y)*
- *Time from injury to surgery 9.4 m (3-24 m)*

J Wrist Surg 2013

Arthroscopic dorsal capsuloligamentous SL ligament repair

Garcia-Elias's staging system:

57 pts

stage 2: 3 pts
stage 3: 25 pts
stage 4: 29 pts

only for stage 4: add pinning KWs

Wahegaonkar AL, Mathoulin CL, J Wrist Surg 2013

Results

- *Mean follow-up 30.7 m (18-43 m)*
- *All pts clinical improvement*

  ROM, pain VAS score, grip strength
- *DASH Score:*

  mean pre-op: 46.04 post-op: 8.3
- *DISI was corrected*

Wahegaonkar AL, Mathoulin CL, J Wrist Surg 2013

Geissler III & IV SLIL tears

arthroscopic –assisted

combined dorsal & volar

SL ligament reconstruction

with tendon graft


Arthroscopic-Assisted Combined Dorsal and Volar Scapholunate Ligament Reconstruction with Tendon Graft for Chronic SL Instability

Chronic SL instability

17 pts

Geissler *grade III:* *3 pts*
grade IV: *14 pts*

- *13/17 pts DISI*
- *6/17 pts stage 1 SLAC*
- *mean age 42 y (26-60 y)*
- *Time from injury to surgery 9.5 m (1.5-28 m)*

J Wrist Surg 2015

Technique

Wrist arthroscopy:

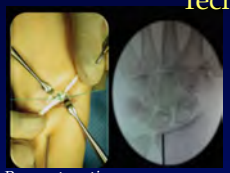
- *Arthroscopic release of fibrosis around scaphoid & lunate*
- *+/- synovectomy*
- *+/- radial styloidectomy*

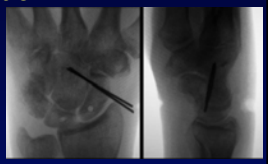
Reconstruction

- *PL tendon graft*
- *correction DISI*
- *lunate tunnel*
- *scaphoid tunnel*

Ho PC, Wong CW, Tse WL. J Wrist Surg 2015

Technique





Reconstruction

- *PL tendon graft*
- *correction DISI*
- *lunate tunnel*
- *scaphoid tunnel*
- *tendon graft is knotted & sutured on dorsal surface SL*
- *transfix SC with 2 KWs*

Ho PC, Wong CW, Tse WL. J Wrist Surg 2015

Results

- *Mean follow-up 48.3 m (11-132 m)*
- *11 pts no pain*
  6 pts pain at extreme of motion
- *13/17 pts return to pre-injury job level*
- *4/17 pts: asymptomatic recurrent DISI*
- *1/17 pts: asymptomatic necrosis proximal scaphoid*

Ho PC, Wong CW, Tse WL. J Wrist Surg 2015

Geissler III & IV SLIL tears

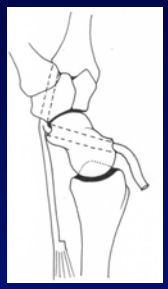
arthroscopic –assisted

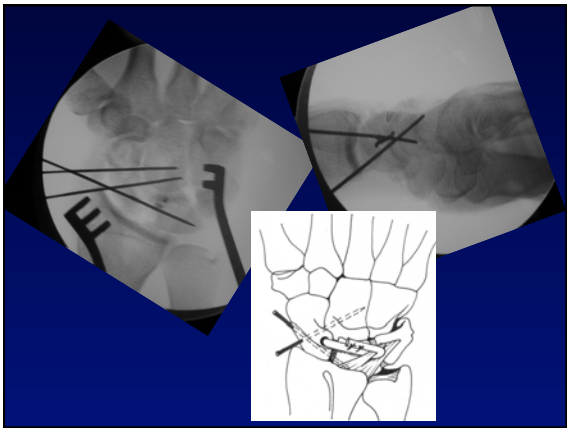
SL ligament reconstruction

with tendon graft

(modified Brunelli)

Modified Brunelli technique





Closed and Arthroscopic Options

When Will It Work?

- *Arthroscopic debridement and pinning in the acute setting comprise a good option for Geissler III partial tears in a younger patient cohort*
- *The results of debridement are less satisfactory in cases of complete tears*
- *Chronic complete tears are contraindication for closed treatment*

Thank you

Precourse 11: Arthroscopic Management of Carpal Instability
8:00 AM - 8:10 AM

Associated Lesions with SL Instability

Randall W. Culp, MD

- Royalty: Arthrosurface
- Consulting Fee: Arthrex

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Speaker has not provided a handout for this presentation

Precourse 11: Arthroscopic Management of Carpal Instability
8:10 AM - 8:20 AM

Arthroscopic Corelli SL ligament reconstruction

Nicholas Charles Smith, MD

● Royalty: Newclip Technics Allegra Orthopaedics

Speaker has not provided a handout for this presentation

Precourse 11: Arthroscopic Management of Carpal Instability
8:20 AM - 8:30 AM

Arthroscopic RASL

Michael R. Hausman, MD

● Receipt of Intellectual Property Rights: Trimed Skeletal Dynamics Checkpoint Surgical NDI Delphian Diagnostics
● Speakers Bureau: Trimed Skeletal Dynamics
● Ownership Interest: Checkpoint Surgical NDI Delphian

Speaker has not provided a handout for this presentation

Precourse 11: Arthroscopic Management of Carpal Instability
8:30 AM - 8:40 AM

Imaging and anatomical considerations for RADICL repair

Scott W. Wolfe, MD

- Royalty: Elsevier, Extremity Medical
- Receipt of Intellectual Property Rights: Extremity Medical
- Consulting Fee: Extremity Medical
- Other: Cartiva, Trimed, Inc.

ASSH
American Society for Surgery of the Hand
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Anatomy of the Dorsal ScaphoLunoTriquetral Ligament Complex

Wessel, L., Kim, D., Ayala-Gamboa, U.A., Ross, M., Couzens, G., Wolfe, S.W.

Introduction

Considerable controversy surrounds the anatomy of the dorsal ligament complex of the proximal carpal row. There is little consensus on the precise origin and insertion points of the extrinsic dorsal radiocarpal (DRC) ligament and the intrinsic dorsal intercarpal (DIC) ligaments. Whether or not the DIC and DRC insert on the lunate is debated. The dorsal scaphotriquetral ligament (DST) has been variably described as a labral-like extension of the proximal row over the dorsal capitate, or a component of the dorsal intercarpal ligament. The purpose of our study is to describe the frequency and dimensions of the insertion sites of the DRC, DST and DIC on the lunate, and the anatomic relationship of the DST and DIC ligaments. We hypothesize that the intracapsular DST and DRC ligaments consistently insert on the dorsal lunate, and the DST represents the deep component of the DIC, intimately bound to the dorsal scapholunate and lunotriquetral ligaments.

Methods

Fourteen fresh-frozen cadaveric specimens (6 M, 8F), age 70.6 (range 61 to 86) were imaged under fluoroscopy to confirm anatomic posture and alignment of the proximal carpal row. Wrists were excluded is they demonstrated arthritis in the radiocarpal or intercarpal joints, or carpal malalignment, as defined by abnormal radio-lunate and scapholunate angles and scapholunate widening. The DRC and DIC ligaments were visually inspected, photographed and measured *in situ*. All measurements were made in radial-ulnar direction and proximal distal-direction at the midpoints of the insertion. The conjoined DRC/DIC ligament insertion on the triquetrum was measured and osteotomized tangentially and lifted radially. The insertion sites of the DIC-DST and DRC on the lunate were measured and divided tangentially to expose the dSLIL. Finally, the DIC-DST insertion on the scaphoid ridge and trapezium-trapezoid were measured in a similar fashion. Insertion areas were approximated by multiplying the two distances, assuming a rectangular shape, and then were mapped to anatomic models.

Results

The conjoined triquetral insertion of the DIC-DST and DRC measures 89.6 ± 6.2 mm^2. In each specimen, the DST represented an inseparable deep subsection of the DIC, and had strong attachments to the lunate 65.0 ± 28.3 mm^2, and scaphoid ridge 67.4 ± 26.8 mm^2. The DRC consistently inserted on the lunate just proximal to the DIC-DST insertion over a smaller surface area, 29.3±27.6 mm^2. The DIC-DST is intimately integrated with the dSLIL, and inserts along the entire dorsal scaphoid ridge 67.4±26.8 mm^2, creating a labral-like covering of the dorsal capitate. The DIC consistently inserted on the trapezoid.

Discussion

These data demonstrate a consistent insertion of both the DIC and DRC on the lunate, confirming Viegas' findings. We found the DST to be intimately related to the DIC, and that it constituted a stout deep subsection of the DIC that spanned the entire proximal row with robust insertion sites on each bone. This may be better identified as the "deep DIC" or the "dorsal scapholunotriquetral" ligament (DSLT), and we believe that the DSLT represents the insertion of the DIC on the three bones of the proximal carpal row. The dorsal lunate ligament insertion zone, or "bare area" is an important anatomic landmark, and should be respected in surgical exposures of the wrist. Finally, we disagree with Viegas that the DIC attachment on the trapezoid is variable, finding a consistent extension across the midcarpal joint to the trapezoid, increasing its labral-like enclosure of the capitate.

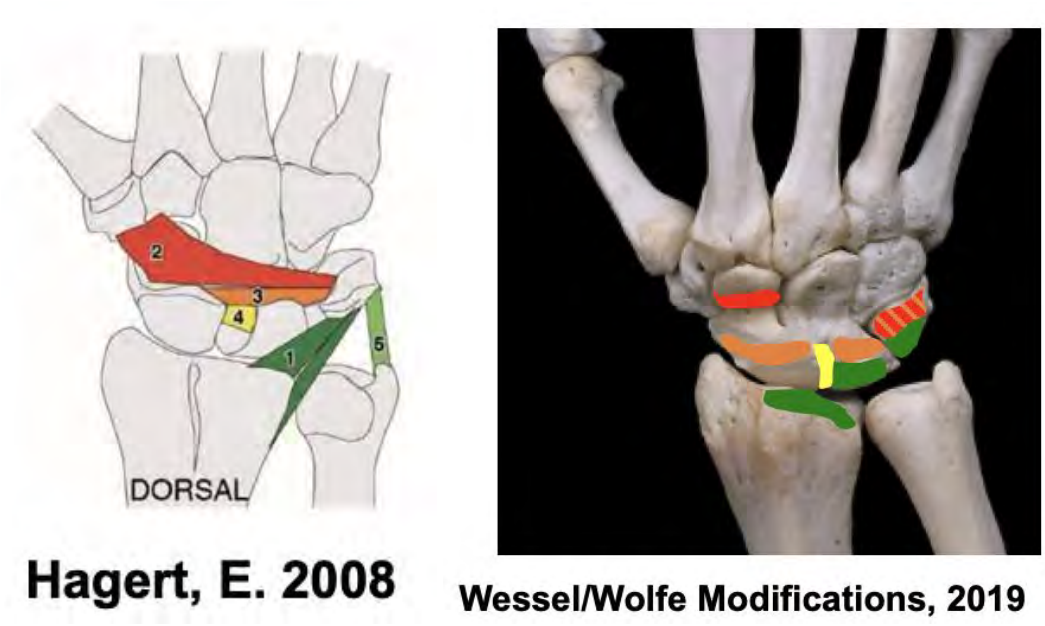

Figure 1. Anatomic mapping of ligament insertions in comparison to Hagert, 2008.

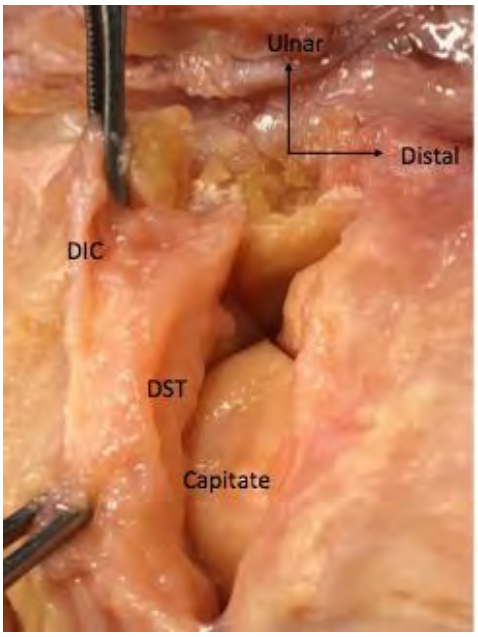

Figure 2. The DIC-DST is intimately integrated with the dSLIL, creating a labral-like covering of the dorsal capitate.

Precourse 11: Arthroscopic Management of Carpal Instability
8:40 AM - 8:50 AM

Arthroscopic repair of DIC ligament

Ubaldo Ayala, MD
No relevant conflicts of interest to disclose

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Speaker has not provided a handout for this presentation

Precourse 11: Arthroscopic Management of Carpal Instability
8:50 AM - 9:00 AM

Arthroscopic Wrist Debridement and Radial Styloidectomy for SLAC wrist

Melvin P. Rosenwasser, MD

● Consulting Fee: Stryker Acumed Zimmer Biomet Conextions

Speaker has not provided a handout for this presentation

Precourse 11: Arthroscopic Management of Carpal Instability
9:00 AM - 9:10 AM

Arthroscopic Resection for Advanced SLAC Wrist

Tyson K. Cobb, MD

- Royalty: Integra life sciences

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Arthroscopic Resection Arthroplasty of Radial Column (ARARC) for SLAC wrist

TYSON K COBB, MD
DAVENPORT, IA USA

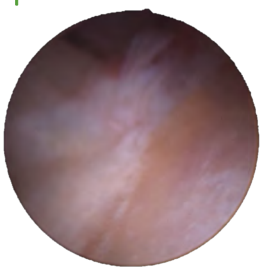
- I have no relevant financial discloses
- Past president International wrist arthroscopy society- Formerly known as EWAS

Warning

The contents of this presentation may be disturbing to some viewers

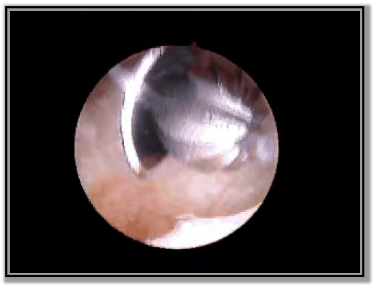
- 57 y/o female with SLAC wrist

Intra-op

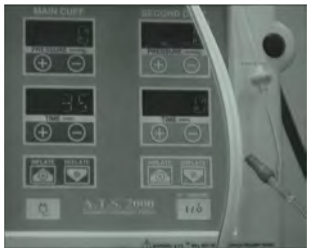


Intra-op

ARA



Postop



Postop

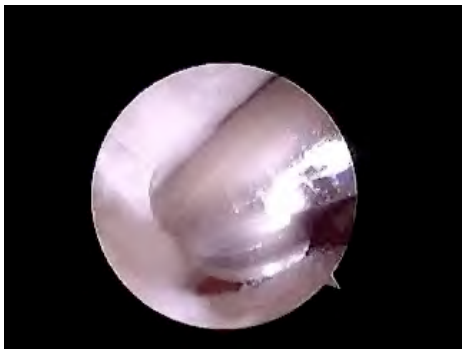
4 months postop

- No pain
- Range of Motion- 50/50

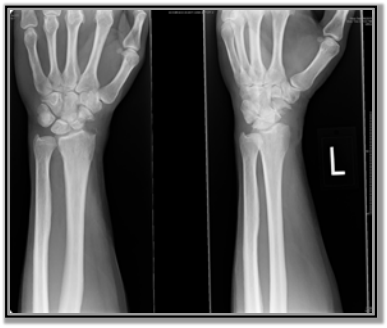
8 Year Follow-up

- Pain 0/10
- Satisfaction 5/5

- 65 y/o male with SNAC wrist
- Radial impingement pain



Postop x-ray



2 months postop

- 95% pain relief
- Bowling 2x's per week
- Range of Motion
  - 15° flexion
  - 60° extension
  - 10° radial deviation
  - 25° ulnar deviation

5 Year Follow-up

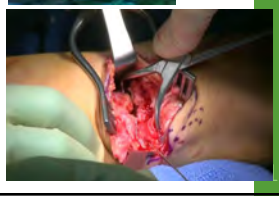
- "Best it's Ever Been"
- Pain 0/10
- Satisfaction 5/5

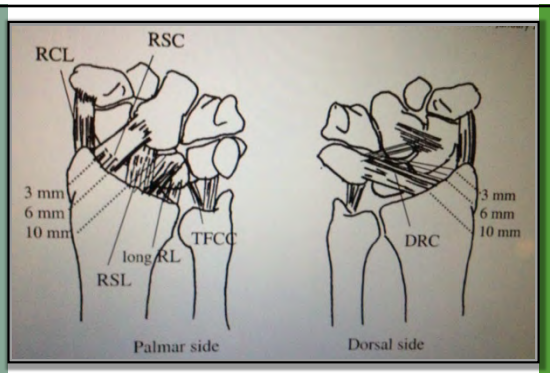
SLAC Wrist: Minimally Invasive Treatment

Arthroscopic Resection Arthroplasty of the Radial Column

Wrist fusion

Proximal Row Carpectomy





Toshiyasu Nakamura, et al. J Hand Surg. Jan 2001;26A(1).

indications

- Pain over radial styloid
- Dorsal pain may not go away

- Last procedure first?

114 Scientific Article

Arthroscopic Resection Arthroplasty of the Radial Column for SLAC Wrist

Tyson K. Cobb, MD[1] Anna L. Walden, MS, OC[1] Jessica M. Will, BSN[1]

[1] Orthopaedic Specialties, Inc., Davenport, Iowa

J Wrist Surg 2014;3:114–122.

Address for correspondence Tyson K. Cobb, MD, Director of Hand and Upper Extremity Service, Orthopaedic Specialties, Inc., 3385 Dexter Court, Davenport, IA 52807 (e-mail: tysncobb@gmail.com).

Abstract

Background Symptomatic advanced scapholunate advanced collapse (SLAC) wrists are typically treated with extensive open procedures, including but not limited to scaphoidectomy plus four-corner fusion (4CF) and proximal row carpectomy (PRC). Although a minimally invasive arthroscopic option would be desirable, no convincing reports exist in the literature. The purpose of this paper is to describe a new surgical technique and outcomes on 14 patients who underwent arthroscopic resection arthroplasty of the radial column (ARARC) for arthroscopic stage II through stage III SLAC wrists and to describe an arthroscopic staging classification of the radiocarpal joint for patients with SLAC wrist.

Patients and Methods Data were collected prospectively on 17 patients presenting with radiographic stage I through III SLAC wrist who underwent ARARC in lieu of scaphoidectomy and 4CF or PRC. Fourteen patients (12 men and 2 women) subject to 1-year follow-up were included. The average age was 57 years (range 41 to 74). The mean follow-up was 24 months (range 12 to 61). Arthroscopic resection arthroplasty of the radial column is described for varying stages of arthritic changes of the radioscaphoid joint. Midcarpal resection was not performed.

Results The mean Disabilities of the Arm, Shoulder, and Hand (DASH) score was 66 preoperatively and 28 at final follow-up. The mean satisfaction (0 = not satisfied, 5 = completely satisfied) at final follow-up was 4.5 (range 3 to 5). The pain level (on 0–10 scale) improved from 6.8 to 1.3. The total arc of motion changed from 124° preoperatively to 142° postoperatively following an ARARC. Grip was 16 kg preoperatively and 18 kg postoperatively. Radiographic stages typically underestimated arthroscopic staging. Although four of our patients appeared to be radiographic stage I, all were found to have arthritis involving some or all of the radioscaphoid articulation at the time of arthroscopy.

Clinical Relevance Pain relief is rapid and remains consistent over time following ARARC. ARARC may be a viable surgical option for patients with SLAC wrist who desire a minimally invasive procedure. Radiographic stages underestimate the degree of arthritic change. Accurate staging requires arthroscopy. The indications and long-term outcome are not well defined; continued surveillance is warranted.

Level of Evidence Level IV, Therapeutic study

Keywords
- arthritis
- arthroplasty
- arthroscopic
- arthroscopy
- minimally invasive
- resection
- scapholunate advanced collapse
- SLAC
- wrist

Purpose

- Patients prospectively enrolled who underwent ARARC for advanced SLAC wrists
- Describe an arthroscopic staging classification of the radiocarpal joint for patients with SLAC wrist
- Compare to literature controls of 4CF

Materials & methods

- Data were collected prospectively: 17 patients
- Underwent ARARC in lieu of 4CF or PRC
- Midcarpal resection was not performed
- Data were analyzed on 14 patients with a minimum of 1-year follow-up: 2 Females / 12 Males
- Mean age: 57 (range 41 to 78)
- Mean follow-up: 24 months (range 12 to 61)

Materials & methods

- COMPARISON
- A study of 4CF was selected from the literature for comparison with similar variables and follow-up*

*Bain GI, Watts AC. The outcome of scaphoid excision and four-corner arthrodesis for advanced carpal collapse at a minimum of ten years. J Hand Surg Am. 2010 May;35(5):719-25.

Arthroscopic classification vs radiographic stage

Arthroscopic Stage	Corresponding Radiographic Stage	Description
Stage I	0 or I	Focal degenerative changes confined to the tip of the radial styloid (3 to 4 mm.). Abundant synovitis is typically present over the involved styloid region, which may obscure a portion of the reactive boney process.
Stage II	I	Degenerative changes of the radial styloid and a portion of the scaphoid fossa.
Stage IIB	I or II	Stage II changes plus corresponding arthritic change (kissing lesions) of the scaphoid.
Stage III	II or III	Loss of cartilage of the entire scaphoid fossa.
Stage IIIB	II or III	Stage III changes plus corresponding changes of the scaphoid.

results

	Preop	Final Follow-up
• Mean DASH (0 to 100)	**66**	**28**
• Mean NRS Pain (0 to 10)	**6.6**	**1.3**
• Mean Total Arc of Motion	**124°**	**142°**
• Median Grip (kg)	**16**	**18**
• Mean Satisfaction (0 to 5)	**N/A**	**4.5**

Pain vs Time

results

- Change in total ROM
- ARARC +18°
- *4CF -19°
- ($p < .001$)

*Bain GI, Watts AC. The outcome of scaphoid excision and four-corner arthrodesis for advanced carpal collapse at a minimum of ten years. J Hand Surg Am. 2010 May;35(5):719-25.

Results

- Median Grip
- Difference in median grip strength between ARARC and 4CF* was not significant ($p = .67$)

*Bain GI, Watts AC. The outcome of scaphoid excision and four-corner arthrodesis for advanced carpal collapse at a minimum of ten years. J Hand Surg Am. 2010 May;35(5):719-25.

(a) Preop PA radiograph showing triquetral-capitate interval. (b) Three-year post-operative PA fist view showing widening of the triquetral-capitate interval. Note that there is no ulnar translation of the lunate but rather radial translation of the distal row on the proximal row.

Results

- ARTHRITIC STAGES
- Radiographic Vs. Arthroscopic
- 4 patients appeared to be radiographic Stage I
- All were found to have arthritis involving some or all of the radioscaphoid articulation at the time of arthroscopy

Failures

- 3 (21%) patients failed due to persistent pain

conclusions

- Pain relief is rapid and remains consistent over time
- ARARC may be a viable surgical treatment option for patients with SLAC wrist who desire a minimally invasive procedure
- Radiographic stages underestimate the degree of arthritic change
- Accurate staging requires arthroscopy
- ARARC may yield better ROM based on comparison to literature controls of 4CF
- Indications and long-term outcome have yet to be defined

- **Arthroscopic Resection Arthroplasty for Scapholunate Advanced Collapse Wrists**
- **Objectives:** We previously published early outcomes of arthroscopic resection arthroplasty of the radial column (ARARC) for scapholunate advanced collapse (SLAC) pattern of degenerative wrist arthritis. The purpose of this study was to report mid-term outcomes following ARARC for SLAC wrists.
- **Methods:** Patients (N=31) with a minimum of 3-year follow-up who underwent ARARC for arthroscopic stage II through IIIB SLAC wrists were evaluated. Fourteen of these patients were included in the previous publication. General, regional, or wide-awake anesthesia was used based on patient preference and medical needs. Standard radiocarpal and midcarpal arthroscopy was performed using standard portals. A radiofrequency ablator was employed for denervation. Resection of the styloid, arthritic portion of the scaphoid fossa of the radius, and the proximal 2/3rd of the scaphoid were performed using a 4 mm barrel bur. Data were prospectively collected before surgery, and at postoperative intervals of 1, 3, 6, and 12 months, and annually thereafter. Numeric Rating Scale (NRS) for pain (0,10; 0=no pain, 10=worst possible pain) and satisfaction with outcomes (0-5, 0=extremely dissatisfied, 5=extremely satisfied) were obtained. Functional outcomes of grip (2ND position on 5-stage dynamometer), wrist range of motion, and disabilities of the arm, shoulder and hand (DASH) score (0-100, 0=no disability, 100=most severe disability) were evaluated. Total arc of motion was calculated by adding flexion, extension, radial deviation and ulnar deviation.
- **Results:** Mean follow-up was 62 months (range 40-78). Mean age was 62 years (range 40-78) with an equal distribution of nonmanual and manual laborers. Mean pain score was 7 (range 3-10) before surgery and 0.3 (range 0-3) at final follow-up. Mean grip strength was 40 lbs. (range 10-80) before surgery and 50 lbs. (range 16-90) at final follow-up. Mean total arc of motion was 113 deg. (range 63-170) before surgery and 127 deg. (range 61-186) at final follow-up. Mean DASH was 42 (range 16-91) before surgery and 3 (range 0-38) at final follow up. Mean final satisfaction was 5 (range 4-5). There were 2 (7%) failures requiring revision surgery for persistent pain.
- **Conclusions:** Although mid-term outcomes with an average 5-year follow-up demonstrate that ARARC may be a viable surgical option for arthroscopic stage II through IIIB SLAC wrists, longer follow-up and prospective studies comparing ARARC to traditional surgical options are required to further evaluate this procedure.

Materials & methods

- 31 patients
- Mean age: 62 (range 40 to 78)
- Work type- half manual laborers
- Mean follow-up: 62 months (range 36 to 120)

31 Patients ARARC for SLAC

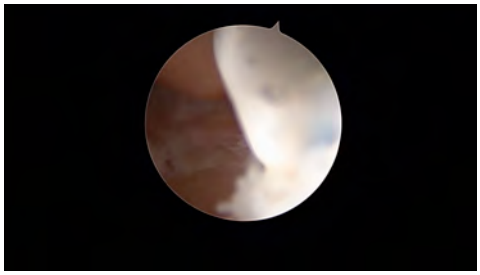
Variable	pre-op	2 Year	5 Year
Pain	7	1.3	0.3
Total Arc Motion	113	127	142
Grip	16 kg	18 kg	23 kg
Satisfaction 0-5	NA	4.5	4.9
DASH	66	28	3

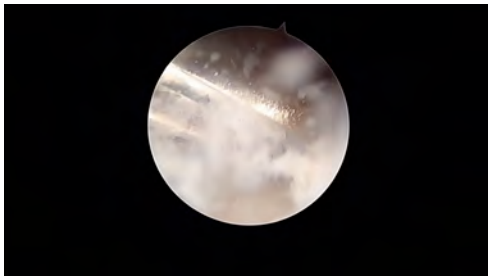
Results

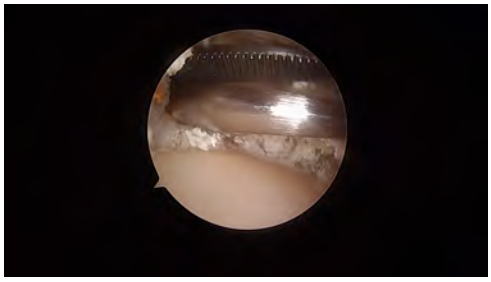
- Failures- 21% in 2014

  7% 2018

Protect Volar Ligaments







Update

- >40 cases
- FU- 10 years
- Failures– 5%

62 Year old with bilateral SLAC wrist
4 corner fusion Lt, ARARC Rt

Thank You

Precourse 11: Arthroscopic Management of Carpal Instability
9:10 AM - 9:20 AM

Arthroscopic arthrodesis for SLAC wrist

Francisco del Piñal, MD
No relevant conflicts of interest to disclose

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Precourse 11: Arthroscopic Management of Carpal Instability
9:20 AM - 9:30 AM

LT Instability: Diagnosis and Grading

Toshiyasu Nakamura, MD, PhD
No relevant conflicts of interest to disclose

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Precourse 11: Arthroscopic Management of Carpal Instability
9:30 AM - 9:40 AM

The Floating Lunate

Alejandro Badia, MD
No relevant conflicts of interest to disclose

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Speaker has not provided a handout for this presentation

Precourse 11: Arthroscopic Management of Carpal Instability
9:40 AM - 9:50 AM

Arthroscopic Tx vs. Graft for gr IV LT instability

Jan-Ragnar Haugstvedt, MD
No relevant conflicts of interest to disclose

Speaker has not provided a handout for this presentation

Precourse 11: Arthroscopic Management of Carpal Instability
9:50 AM - 10:00 AM

Role of Arthroscopy for Radiocarpal Dislocation

David J. Slutsky, MD
● Royalty: Book royalty from elsevier and thieme

Speaker has not provided a handout for this presentation

Precourse 11: Arthroscopic Management of Carpal Instability
10:00 AM - 10:10 AM

Arthroscopy for Lunate Fractures with Radiocarpal and Midcarpal Instabilities

Gregory I. Bain, FRACS, PhD
No relevant conflicts of interest to disclose

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Precourse 11: Arthroscopic Management of Carpal Instability
10:10 AM - 10:20 AM

Arthroscopic Treatment of PLD and PLFD

Bo Liu, MD
No relevant conflicts of interest to disclose

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Precourse 11: Arthroscopic Management of Carpal Instability
10:20 AM - 10:30 AM

Arthroscopic Treatment of Perilunate Injuries

Guillaume Herzberg, MD, PhD
● Royalty: Groupe LEPINE Company

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Precourse 11: Arthroscopic Management of Carpal Instability
10:30 AM - 10:40 AM

Arthroscopic DRCL repairs

Mark Ross, FRACS

- Royalty: Integra Newclip
- Receipt of Intellectual Property Rights: Integra Newclip
- Consulting Fee: Integra Newclip Lima Tornier
- Speakers Bureau: Integra Newclip Lima Tornier Depuy Synthes
- Contracted Research: Integra

Speaker has not provided a handout for this presentation

Precourse 11: Arthroscopic Management of Carpal Instability
10:40 AM - 10:50 AM

Arhroscopy and MCI

Randip R. Bindra, FRCS, MCh Orth

- Royalty: Acumed llc Integra LifeSciences
- Receipt of Intellectual Property Rights: Acumed LLc Integra LifeSciences
- Speakers Bureau: Acumed LLc Integra LifeSciences

Speaker has not provided a handout for this presentation

Precourse 11: Arthroscopic Management of Carpal Instability
10:50 AM - 11:00 AM

Role of Arthroscopy in treatment of Palmar Midcarpal Instability

Pak-cheong Ho, MD
No relevant conflicts of interest to disclose

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