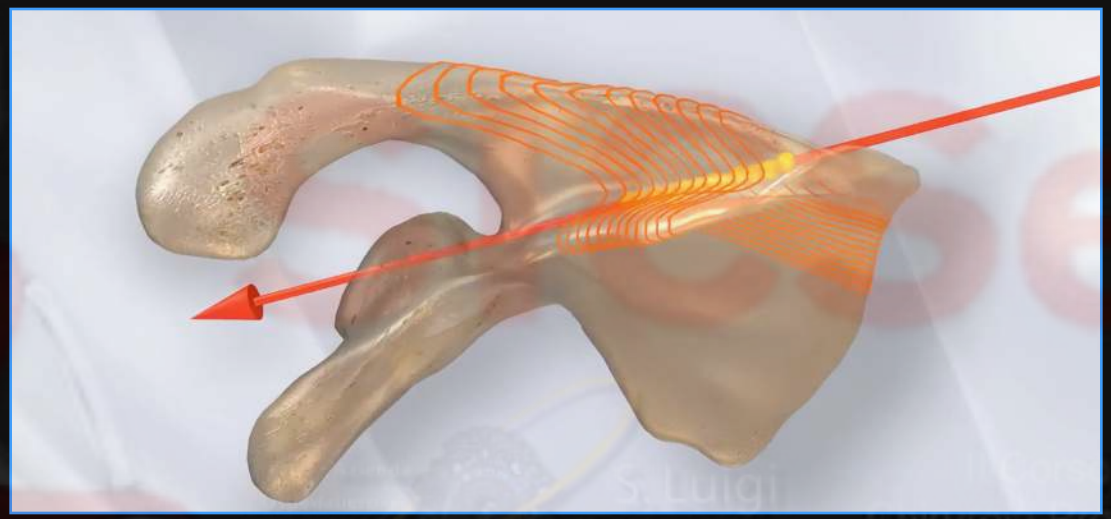
PROTESI TOTALE INVERSA PLANNING: Che cosa mi puo' dire l'imaging



R GAROFALO

UOSD Chirurgia dell' arto superiore
Ospedale F Miulli-Ente Ecclesiastico
Acquaviva delle fonti-BA

SICSeG
Società Italiana di Chirurgia della Spalla e del Gomito

Ente Ecclesiastico
Ospedale Generale Regionale
MIULLI

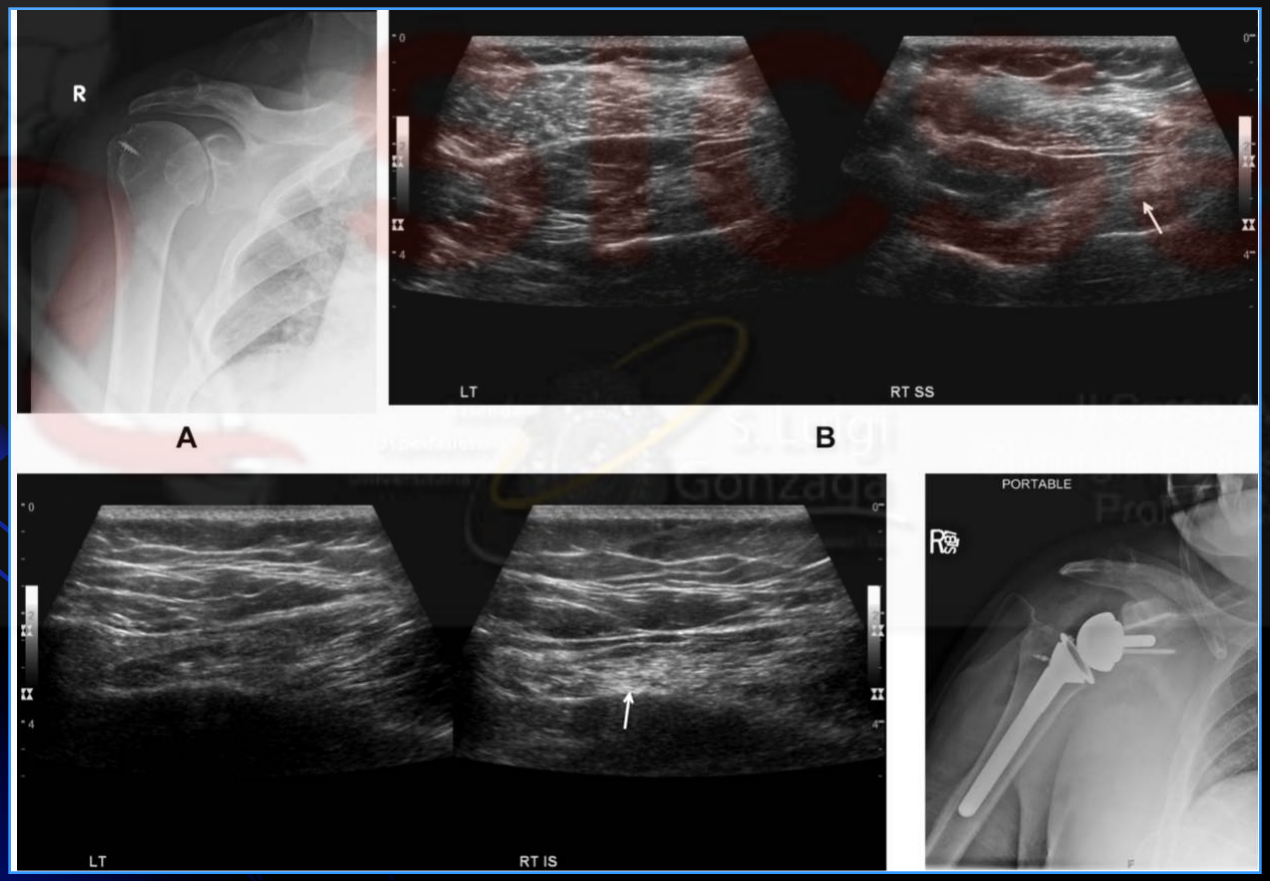
STANDARD RX

Non sufficienti nel planning preoperatorio di una protesi di spalla

Impact of Shoulder Sonography on

Impact of Shoulder Sonography on
Clinical Decision Making

Michael V. Friedman, MD, Travis J. Hillen, MD, David V. Holland, MD, James M. Essenberg, MD, Jennifer L. Demertzis, MD



Int J Shoulder Surg. 2013 Oct-Dec; 7(4): 127–131.
doi: 10.4103/0973-6042.123509
PMCID: PMC3883186

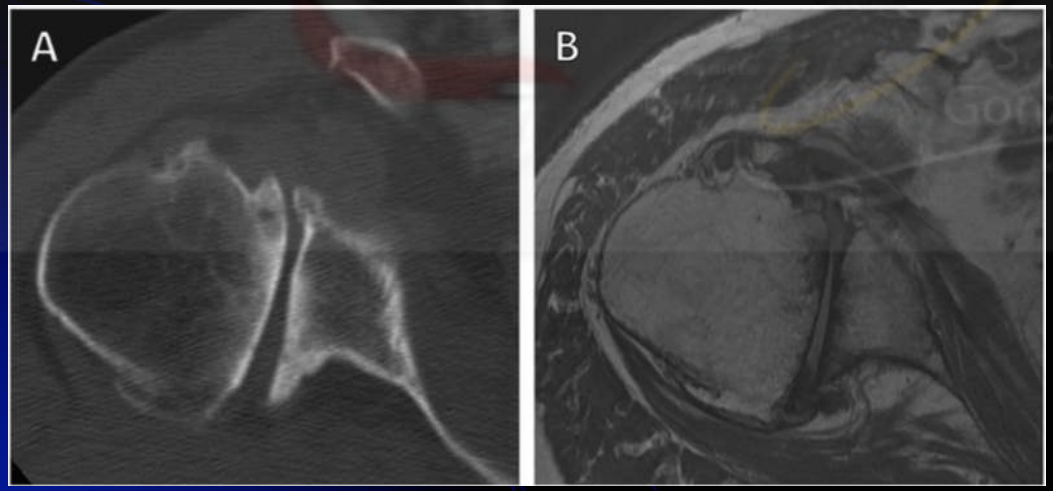
The influence of rotator cuff pathology on functional outcome in total shoulder replacement

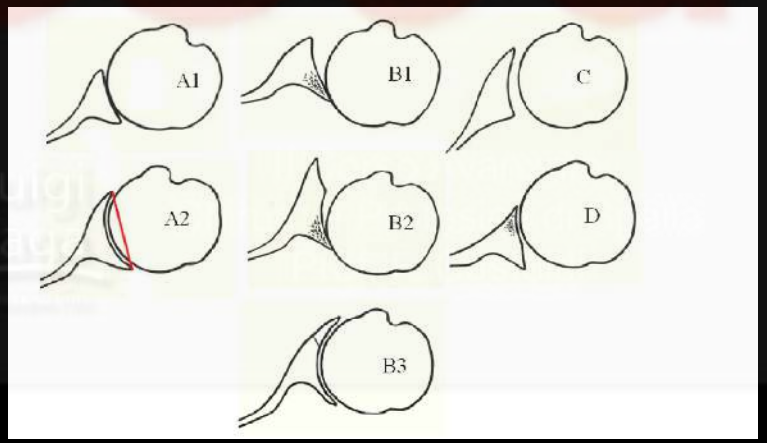
Nathanael Ahearn, Philip A McCann, Andrew Tasker, and Partha P Sarangi

Tendinopathy or small tear particularly of superior cuff also if not repaired do not significantly affect functional outcomes after TSR

Magnetic resonance imaging is comparable to computed tomography for determination of glenoid version but does not accurately distinguish between Walch B2 and C classifications

Jeremiah T. Lowe, BA[a,b], Edward J. Testa, BA[c], Xinning Li, MD[d], Suzanne Miller, MD[a,b], Joseph P. DeAngelis, MD[e], Andrew Jawa, MD[a,b,c,*]





J Shoulder Elbow Surg (2017) 26, 669–673

J Shoulder Elbow Surg (2018) 27, 1451–1455

ELSEVIER

JOURNAL OF SHOULDER AND ELBOW SURGERY

www.elsevier.com/locate/ymse

Computed tomography underestimates rotator cuff pathology in patients with glenohumeral osteoarthritis

Megan Fitzgerald, BA[a,b], Sarah M. Lawler, BA[a,b], Jeremiah T. Lowe, BA[a,b], Ryan Nelson, DO[a], Matthew T. Mantell, MD[a], Andrew Jawa, MD[a,b,*]

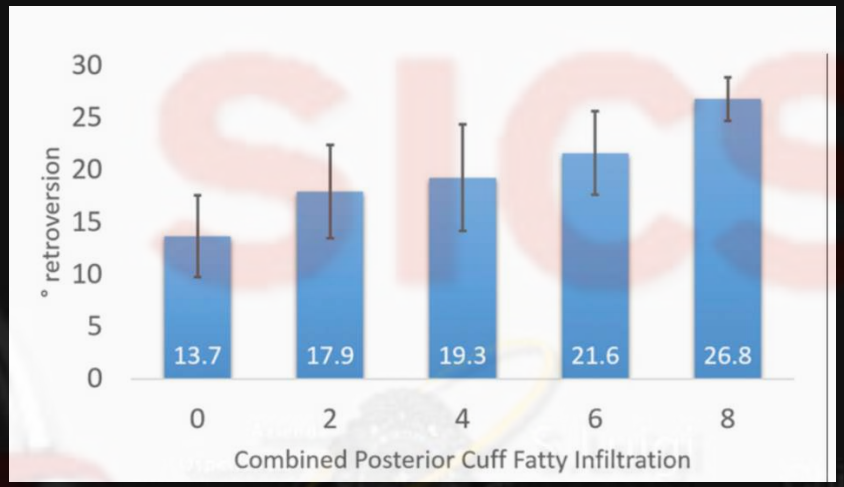
Conclusion

CT underestimates the frequency of full-thickness RCTs and the severity of fatty infiltration and muscle atrophy in the setting of GHOA compared with MRI. CT sensitivity (20%) and positive predictive value (33.3%) in diagnosing full-thickness RCT were low compared with previous findings in which sensitivity ranged from 89% to 100% on MRI.[9,12,13] Moreover, fatty infiltration in 3 of the 4 rotator cuff muscles (SS, ISP, and SSC) was significantly lower on CT scan than on MRI, suggesting that the ability of CT to visualize soft tissue and rotator cuff

The Association Between Rotator Cuff Muscle Fatty Infiltration and Glenoid Morphology in Glenohumeral Osteoarthritis

Kenneth W. Donohue, MD, Eric T. Ricchetti, MD, Jason C. Ho, MD, and Joseph P. Iannotti, MD, PhD

Investigation performed at the Orthopaedic and Rheumatologic Institute, Cleveland, Ohio



Conclusions: High-grade rotator cuff muscle fatty infiltration is associated with B3 glenoids, increased pathologic glenoid retroversion, and increased joint-line medialization. Additional studies are needed to determine the causal relationship between these muscle changes and glenoid wear, whether these muscle changes independently affect clinical and radiographic outcomes in anatomic TSA, and whether fatty infiltration can improve postoperatively with correction of pathologic version and/or joint-line restoration.

Clinical Relevance: This study investigates the association between different patterns of glenoid bone loss and rotator cuff muscle fatty infiltration. Both factors have been shown to affect clinical outcome following TSA.

J Bone Joint Surg Am. 2018;100:381-7

Contents lists available at ScienceDirect

Journal of Orthopaedic Science

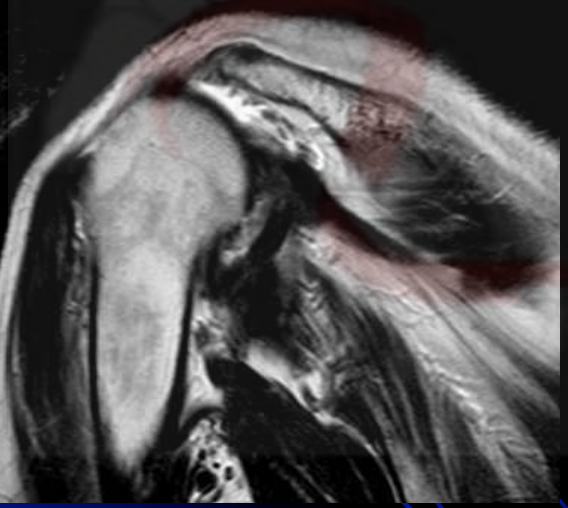
journal homepage: http://www.elsevier.com/locate/jos

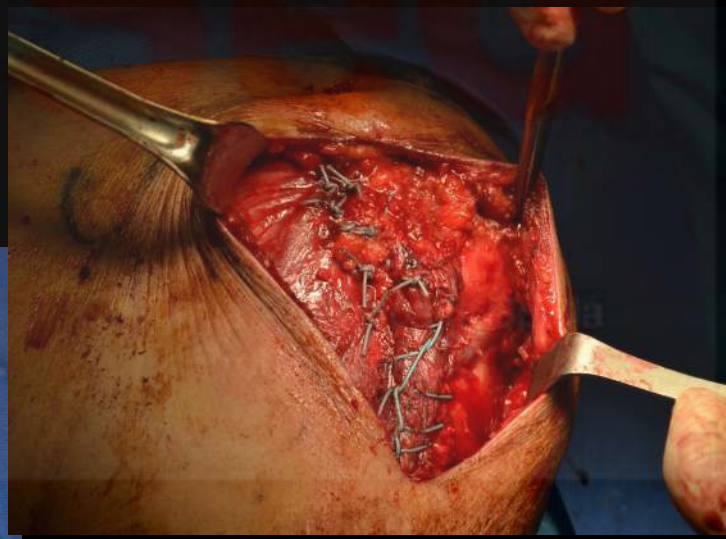
Original Article

Massive irreparable rotator cuff tear and associated deltoid tear. Does the reverse shoulder arthroplasty and deltoid repair be a possible option of treatment?

Raffaele Garofalo [a, *], Brody Flanagin [b], Alessandro Castagna [c], Vittorio Calvisi [d], Sumant G. Krishnan [b]

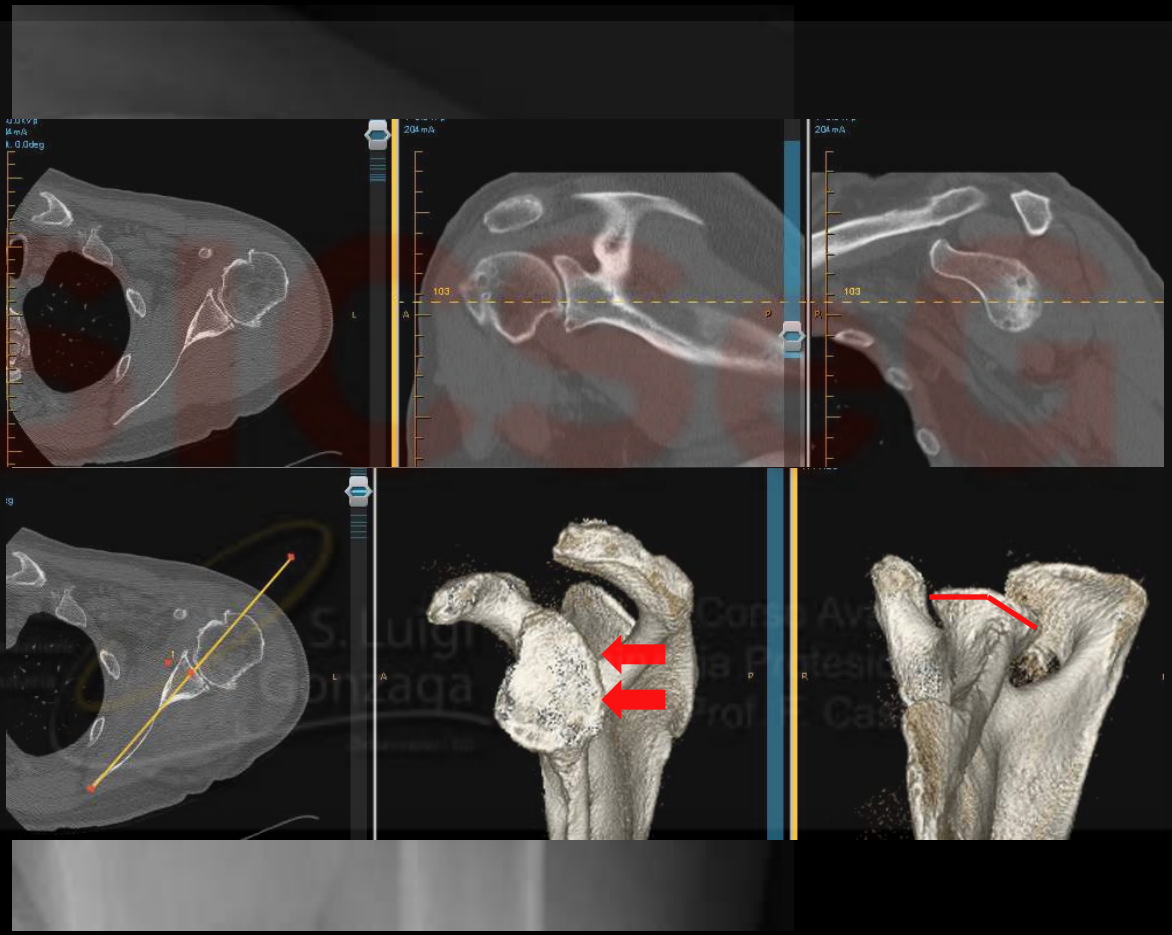
[a] Upper Limb Unit, F Miulli Hospital, Acquaviva delle Fonti, BA, Italy
[b] The Shoulder Center, Baylor University Medical Center at Dallas, USA
[c] Shoulder and Elbow Unit, IRCCS, Humanitas Institute, Milan, Italy
[d] Department of Life, Health & Environmental Sciences, University of L'Aquila, Italy





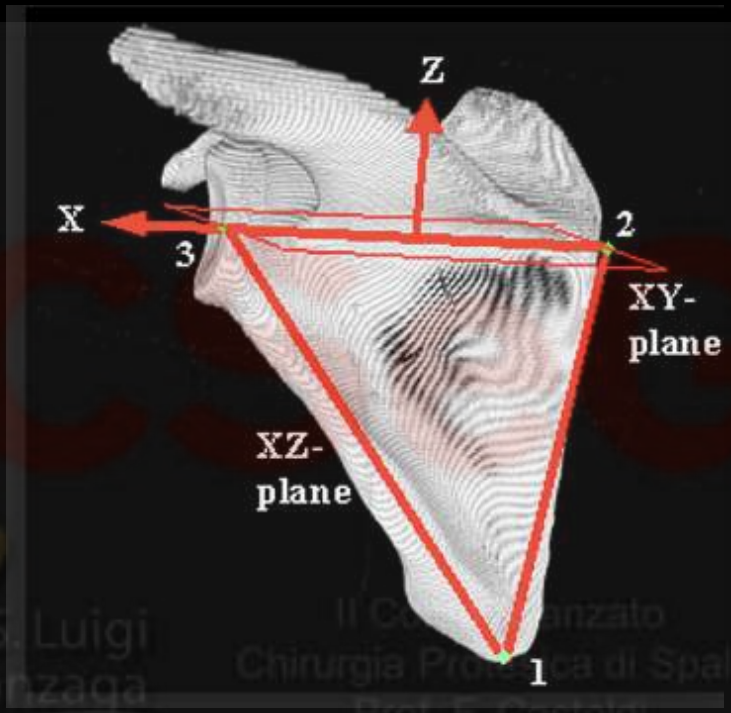
IMAGING

- Un’ accurata valutazione della Deformità della glenoide richiede esami strumentali avanzati….



IMAGING

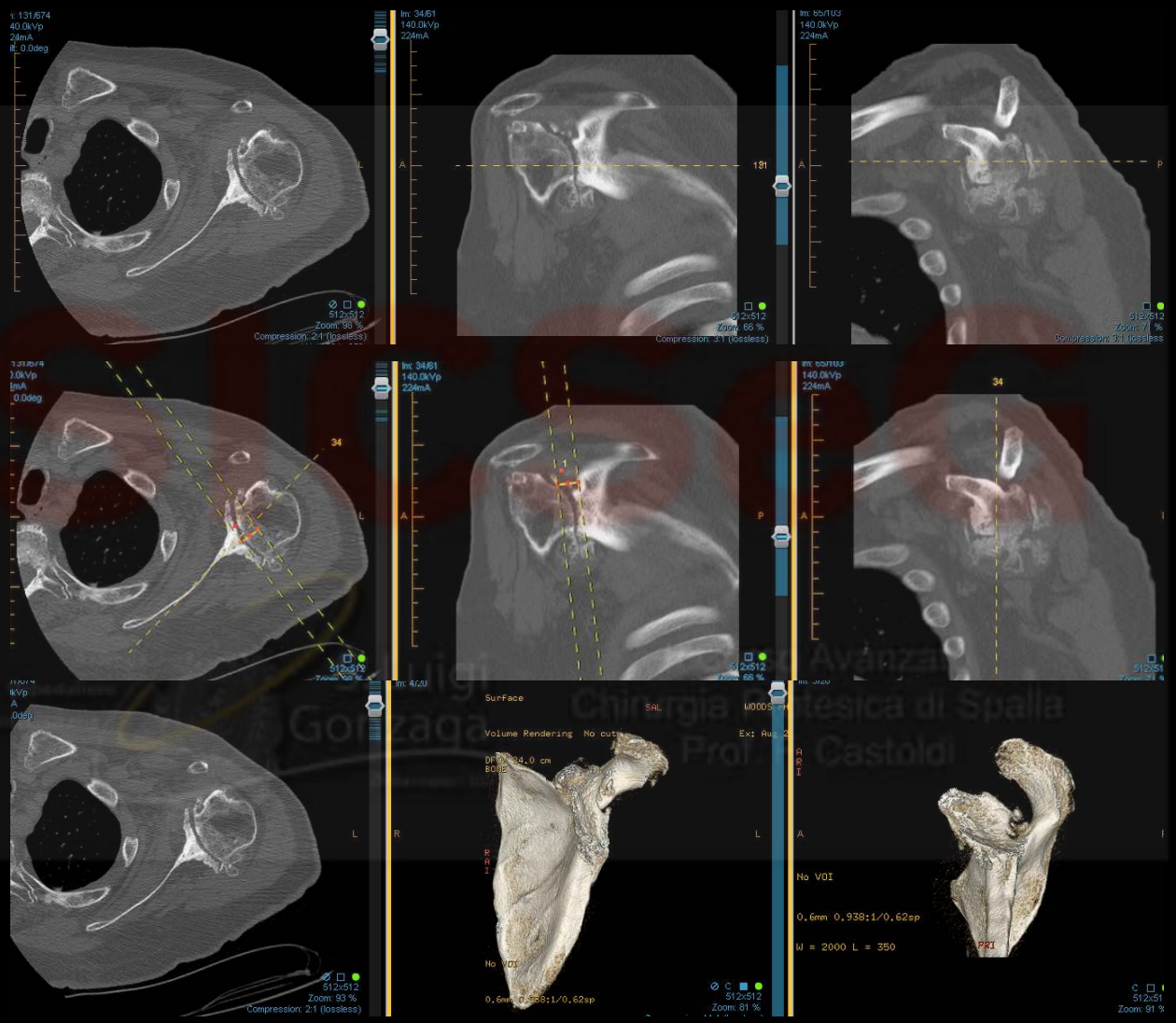
- La deformità glenoidea e l'erosione è spesso una patologia multiplanare



XY = Medializzazione
XY = Retroversione
XZ = Inclinazione

•Moineau G 2012
•Knowles NK 2015
•Maurer A 2012

PLANNING PREOPERATORIO



PIANO PREDOMINATE DELLA DEFORMITA':

- Retroversione
- Medializzazzione
- Inclinazione

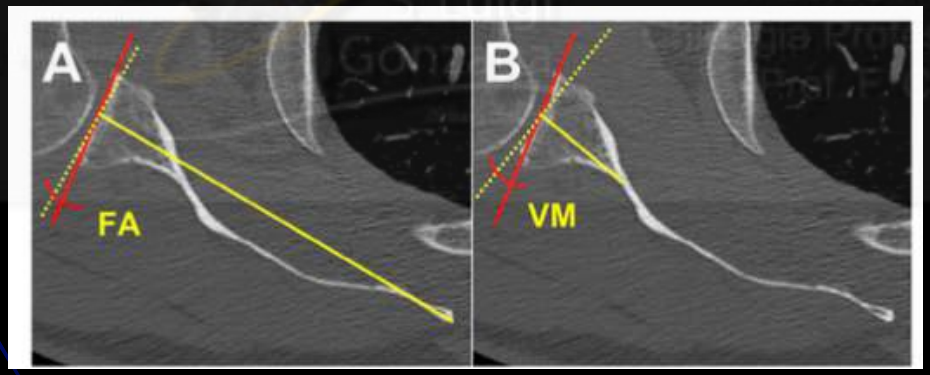
Piano secondario della deformità:

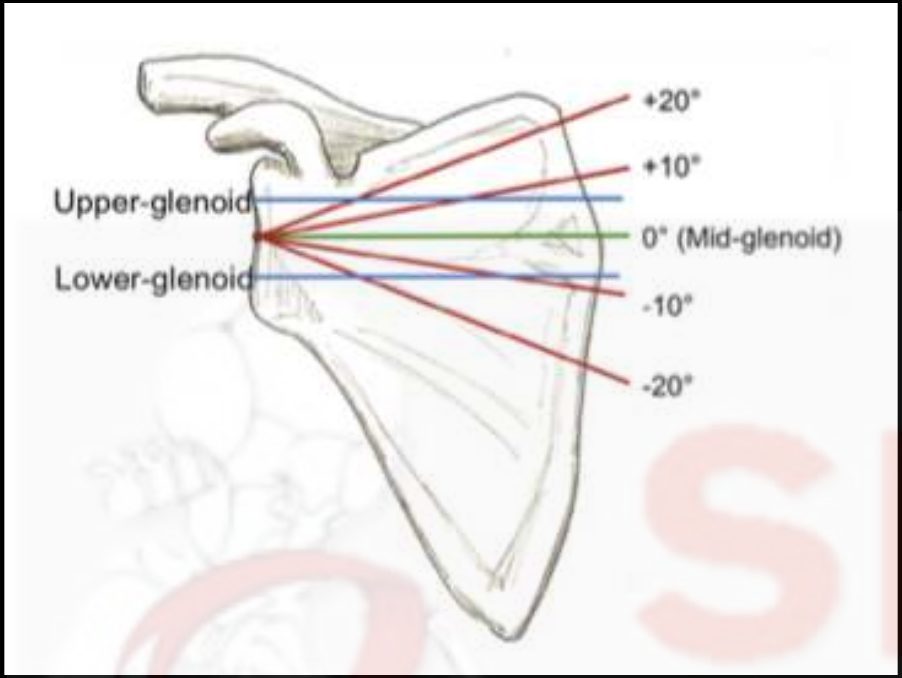
- Retroversione/Medializzazzione
- Retroversione/Inclinazione
- Medializzazzione/Inclinazione
- Retroversione/ Medializzazzione/Inclinazione (rare)

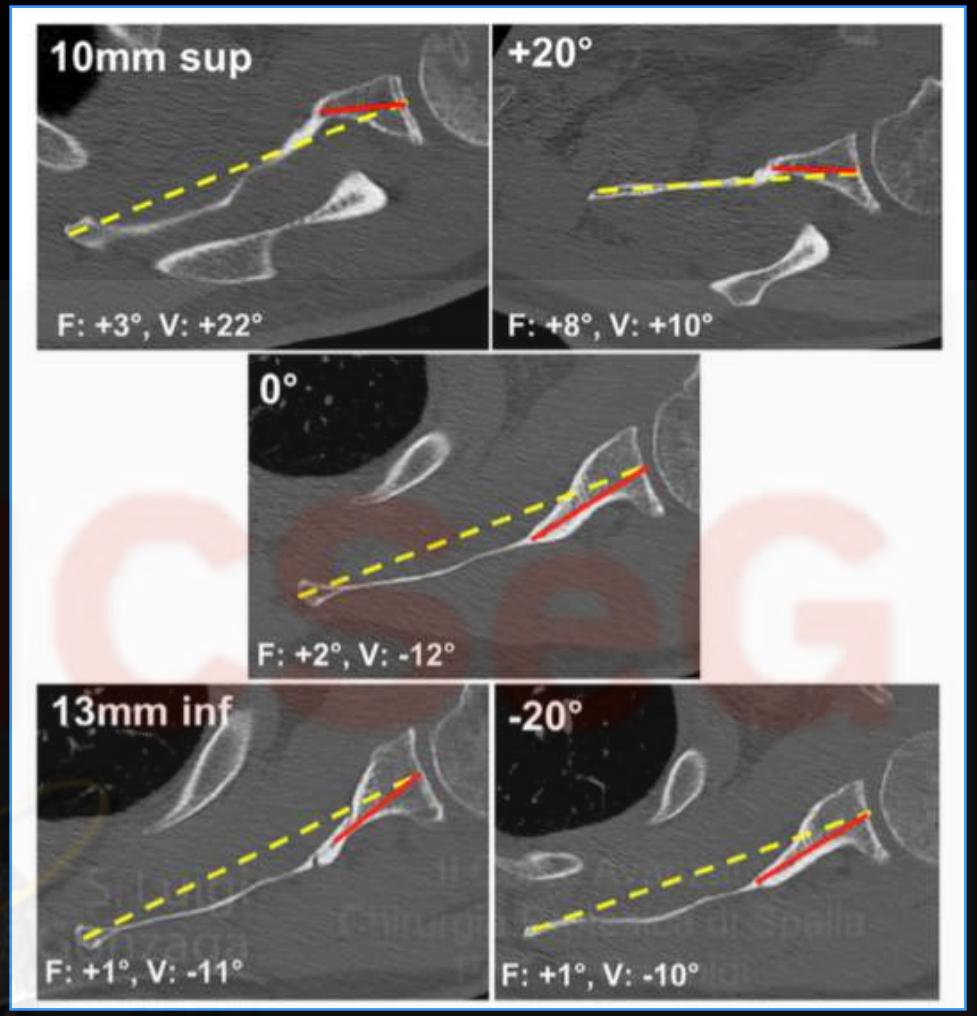
COME MISURARE !!!!

Comparative analysis of 2 glenoid version measurement methods in variable axial slices on 3-dimensionally reconstructed computed tomography scans

Gregory Cunningham, MD[a,b,*], John Freebody, MD[c], Margaret M. Smith, PhD[d], Mohy E. Taha, MD[e], Allan A. Young, MBBS, MSpMed, PhD, FRACS[f], Benjamin Cass, MBBS, MS, FRACS[f], Bruno Giuffre, MBBS, FRANZCR[c]







Conclusion

Version at the mid and lower glenoid is similar using the vault method or Friedman angle. However, the vault method shows less reliability and more variability according to slice height and angulation. Yet, as it shows significantly more retroversion than the Friedman angle, it should still be used in situations where maximum bone purchase is sought with glenoid implants. For any other situation, the Friedman angle remains the method of choice.

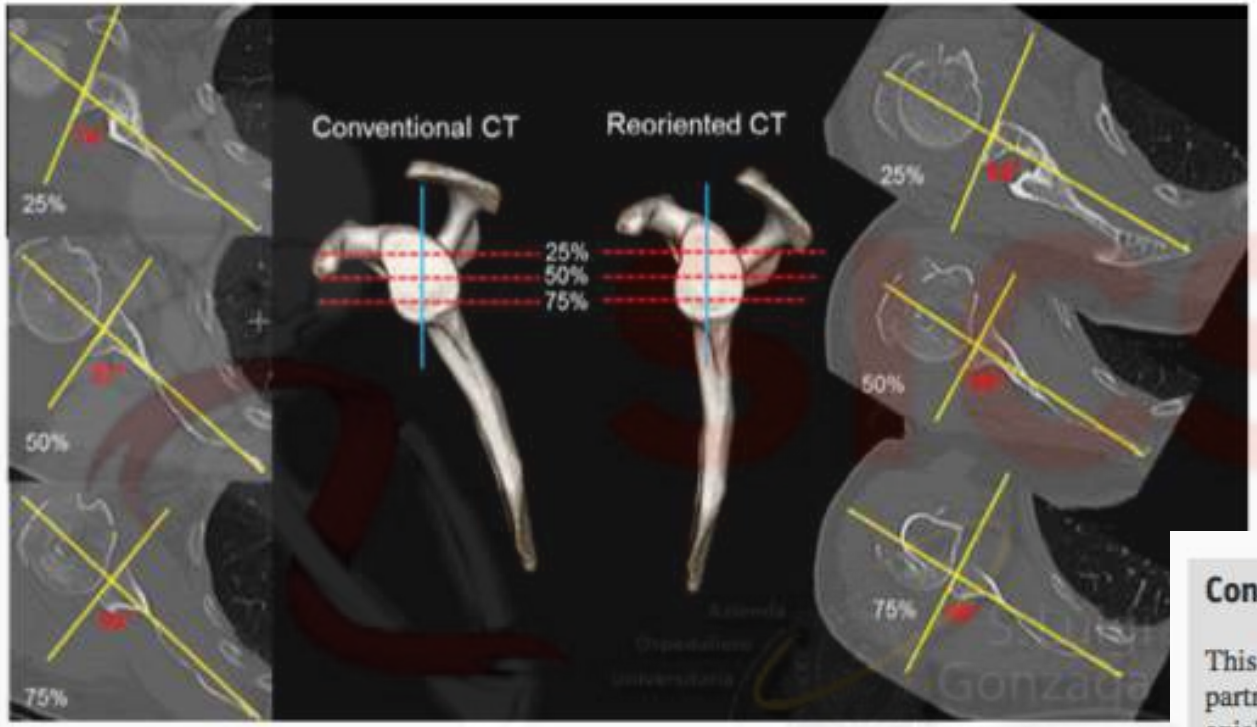
LIVELLO DI SEZIONE !!!!

STESSO PAZIENTE

J Shoulder Elbow Surg. 2018 Jul;27(7):1297-1305. doi: 10.1016/j.jse.2017.11.020. Epub 2018 Jan 10.

Interdepartmental imaging protocol for clinically based three-dimensional computed tomography can provide accurate measurement of glenoid version.

Zale CL[1], Pace GI[1], Lewis GS[1], Chan J[1], Kim HM[2].

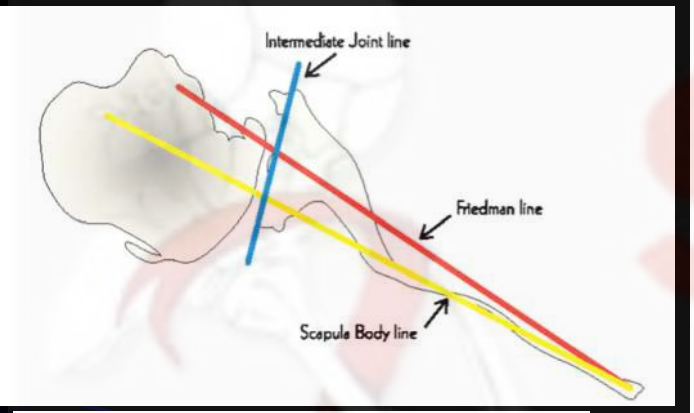


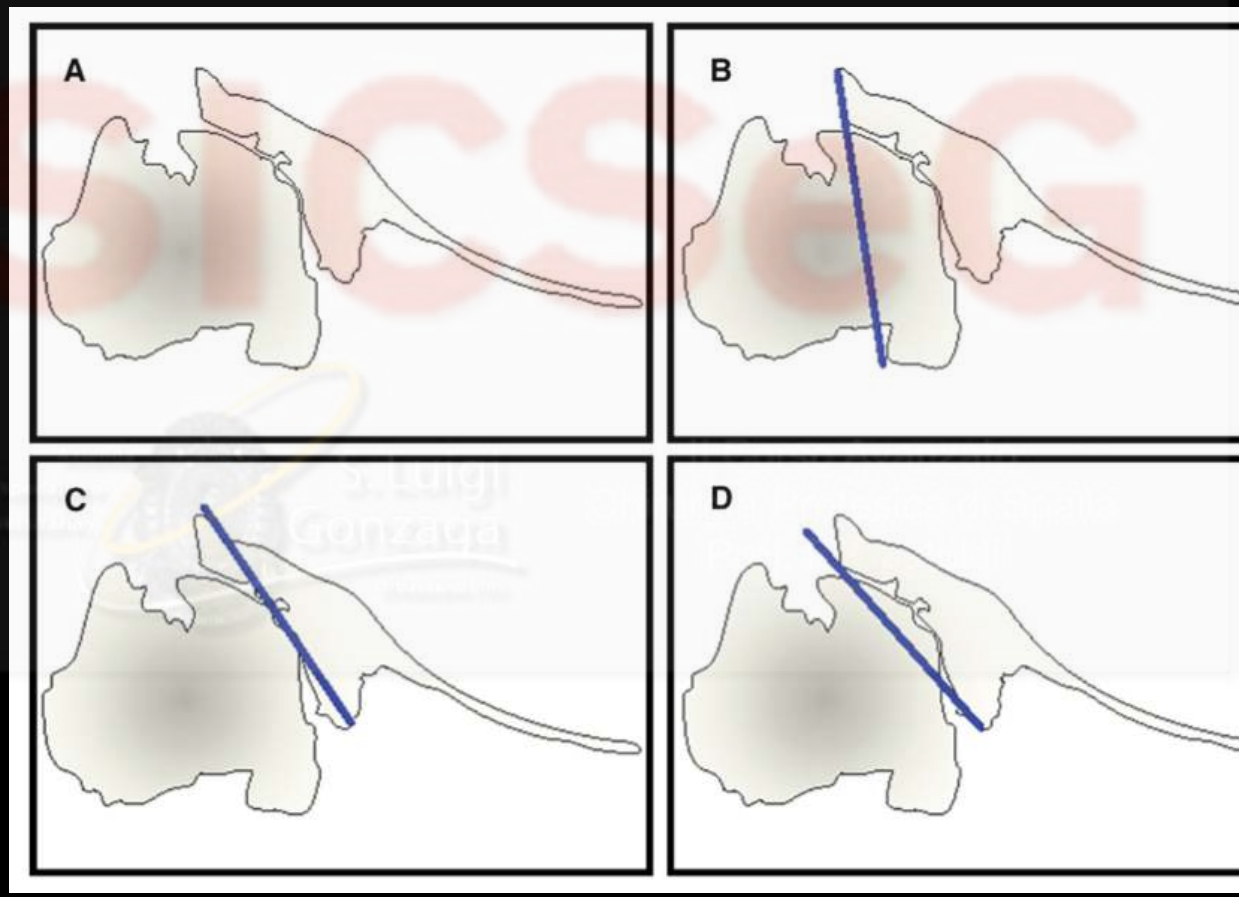
Conclusions

This study demonstrated that a well-established interdepartmental protocol can generate reoriented anatomic 2D axial CT images that are as accurate as the gold standard in glenoid version measurement. Establishing such an institutional protocol would help surgeons accurately evaluate the glenoid version preoperatively with reduced workload and expense. Normal glenoids showed increased retroversion superiorly in considering different axial slice levels, and this phenomenon was exaggerated in conventional CT. Future use of an interdepartmental protocol for clinical or research purposes would call for accurate communication among examiners to clarify whether reoriented anatomic CT or conventional CT has been used for glenoid version measurement.

Glenoid version: How to measure it? Validity of different methods in two-dimensional computed tomography scans

Dominique M. Rouleau, MD, MSc, FRCSC[a,*], Jacob F. Kidder, MD[b], Juan Pons-Villanueva, MD[c], Savvas Dynamidis, MD[d], Michael Defranco, MD[e], Gilles Walch, MD[f]





Conclusions

The glenoid version measurement is reliable on a 2D CT scan. According to the correlation found in our results and in those of the literature, it seems that there is no advantage on 3D CT scans to assess version in terms of reliability of measures. Despite very good reliability of both methods, we suggest the use of the Friedman method because it is more user friendly in the presence of a curved scapula for all glenoid types. In the presence of B2 glenoid and posterior erosion, the choice of an intermediate glenoid line is more reliable. That line also represents the surface that can be obtained with minimal bone loss after conservative reaming of the glenoid surface. This intermediate line can easily be drawn in surgical preparation on the CT scan, and the treating surgeon can decide if the obtained version is acceptable or if a more complex strategy is needed, such as grafting. Statistical significance and practical consideration in arthroplasty underline the choice of that intermediate glenoid line in the B2 glenoid.

The influence of three-dimensional planning on decision-making in total shoulder arthroplasty

Birgit S. Werner, MD[a,*], Robert Hudek, MD[a], Klaus J. Burkhart, MD[a,b], Frank Gohlke, MD[a]

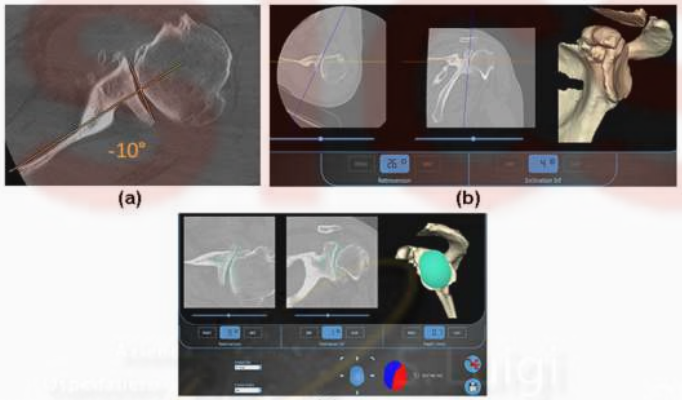
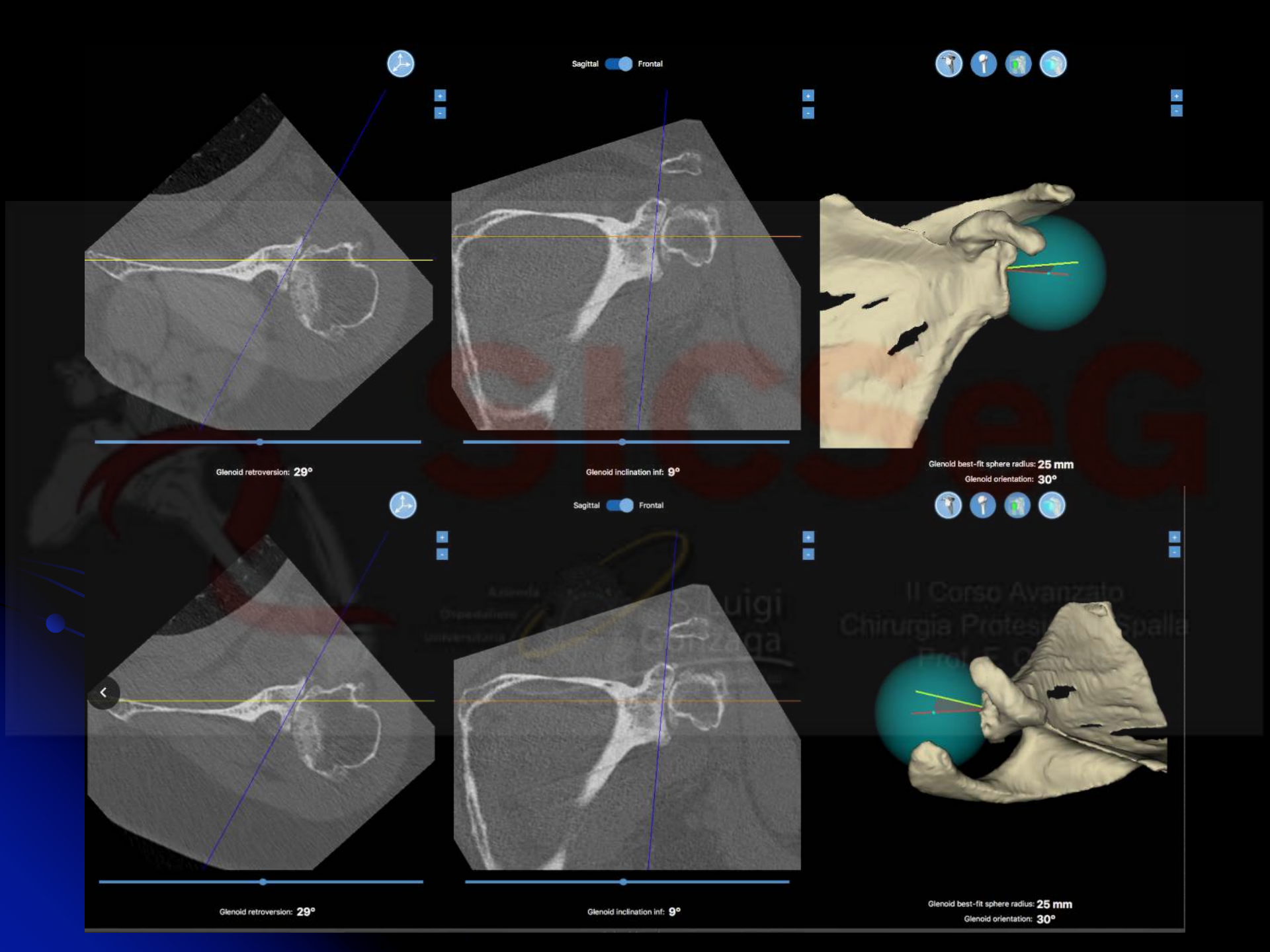


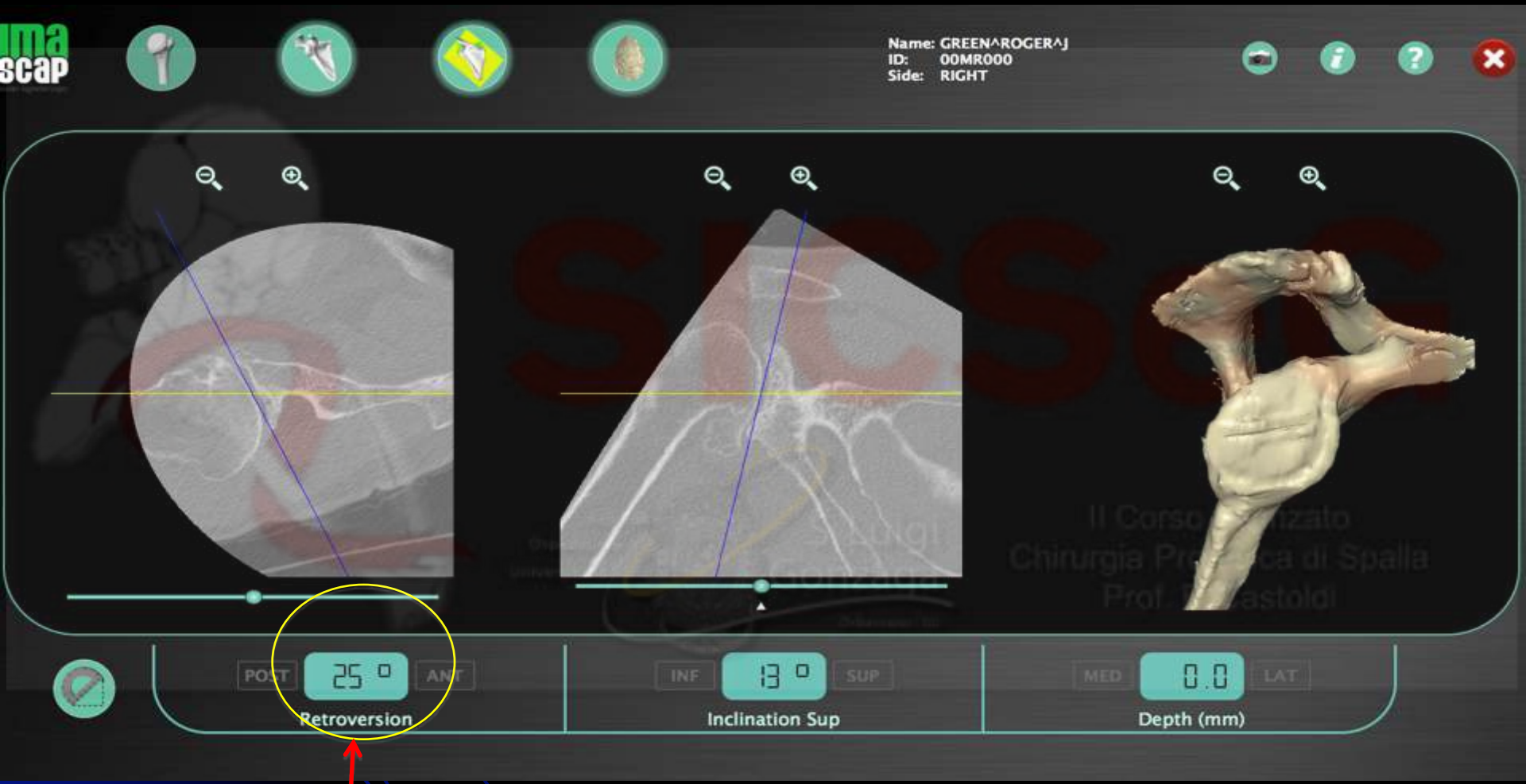
Figure 1 (**A**) A 66 year-old man (B2 glenoid, cuff intact) demonstrates 10° of glenoid retroversion in 2-dimensional (2D) imaging using the Friedman method. The 3D imaging software indicated a glenoid retroversion of 26° based on a 3D point cloud of the complete scapula. (**B**) A 2D axial and coronal cut is shown in relation to the scapular plane (*yellow line*) at the middle level of the glenoid fossa and 3D reconstruction of the scapula provided by the software program. (**C**) Virtual implantation of an anatomic glenoid component respecting the current guidelines of glenoid positioning (<10° glenoid retroversion, ≥80% seating, preservation of the subchondral bone stock) was impossible because of insufficient seating; therefore, the indication for total shoulder arthroplasty was changed to a reverse shoulder arthroplasty.

Conclusion

Measurements of glenoid version and inclination on reformatted 2D CT scans are less accurate compared with 3D measurements. A preoperative 3D planning software allows for improvement of virtual glenoid positioning and influences the decision-making process.

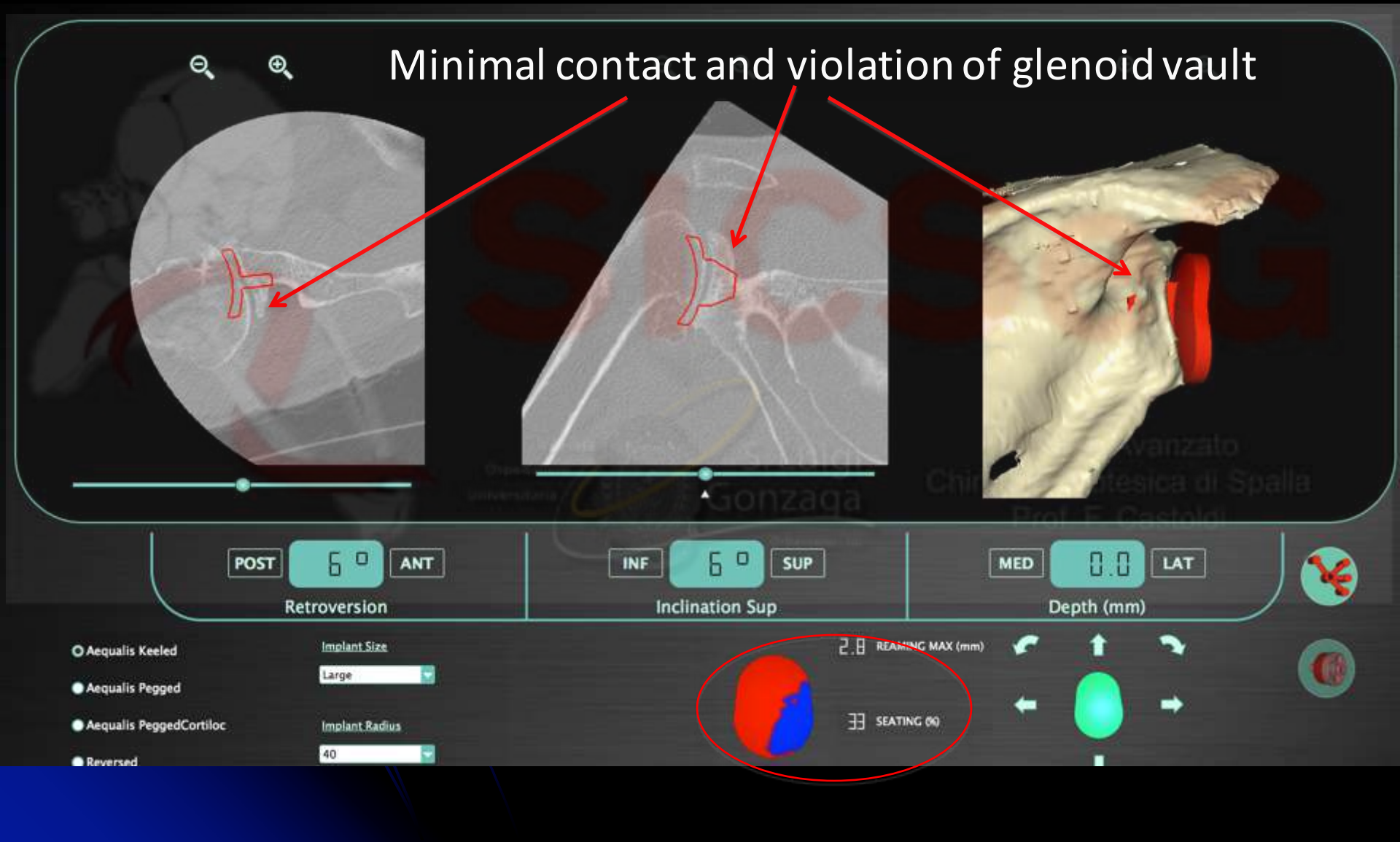

Sagittal
Frontal
Glenoid retroversion: 29°
Glenoid inclination inf: 9°
Glenoid best-fit sphere radius: 25 mm
Glenoid orientation: 30°
Sagittal
Frontal
Glenoid retroversion: 29°
Glenoid inclination inf: 9°
Glenoid best-fit sphere radius: 25 mm
Glenoid orientation: 30°

BluePrint 3D operative planning



25^{O} Retroversion

BluePrint 3D operative planning

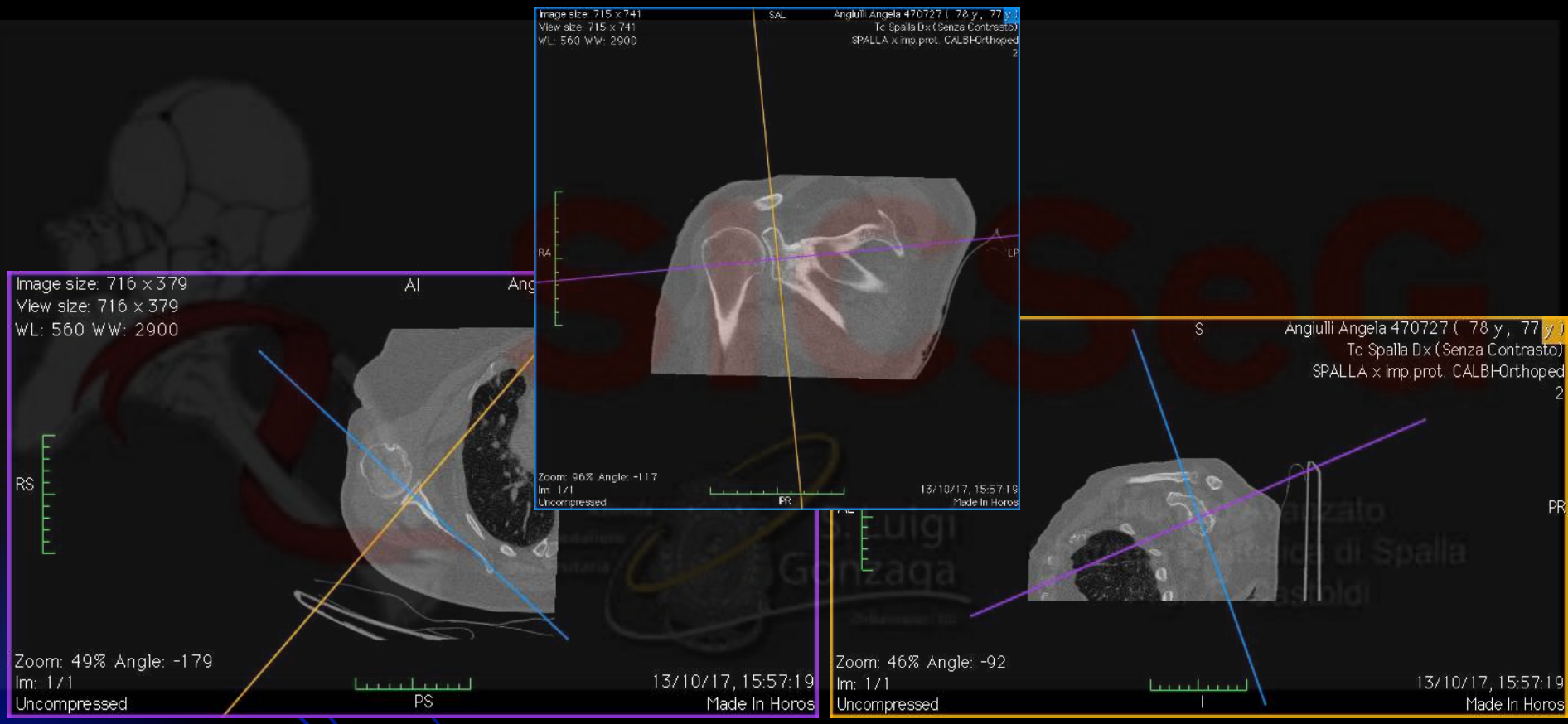


obliqu

STUDIO COMPARATIVO

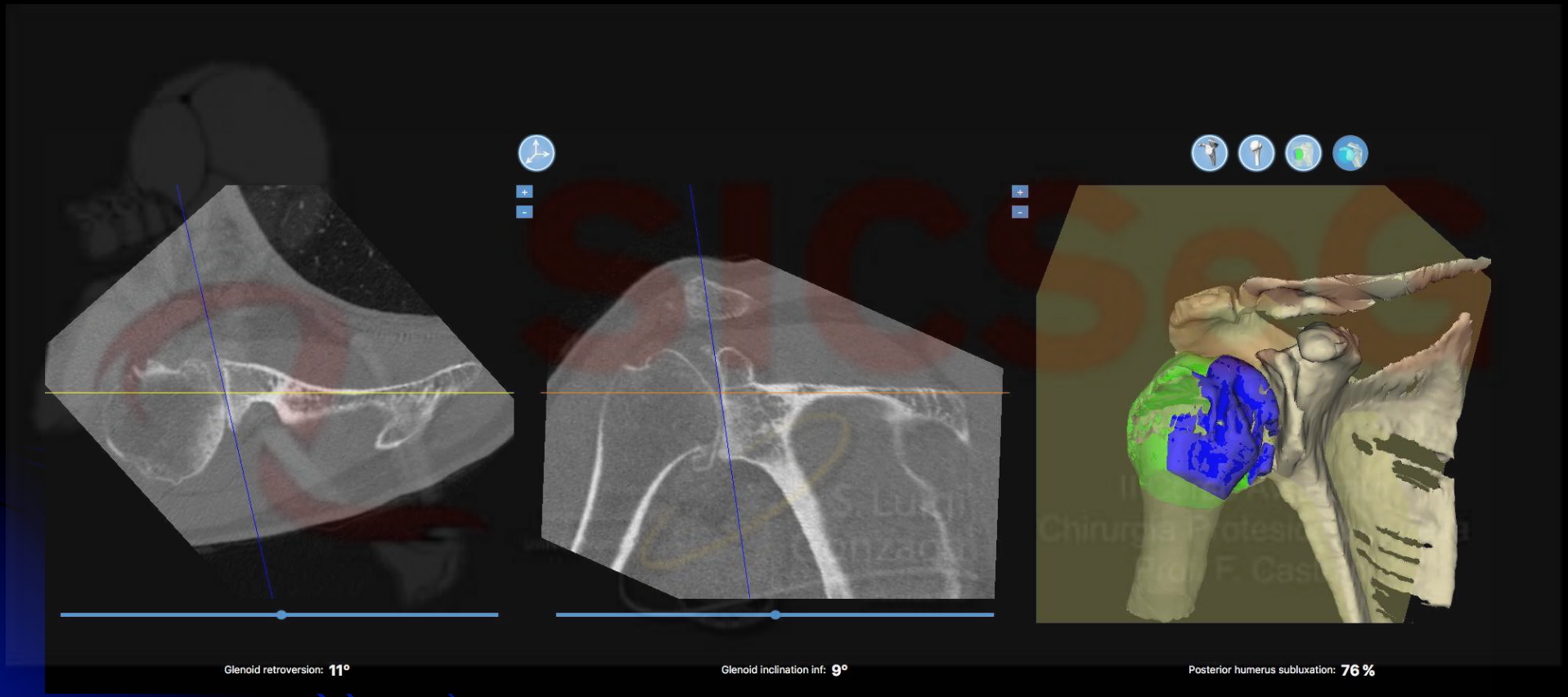
- **Blue Print** : Versione e Inclinazione
- **AF**: Versione, inclinazione; valutazione glena sec classificazione di Walch sul piano trasversale e Favard sul piano frontale; angolo RSA
- Sistema utilizzato per le ns misurazioni: Horos
- Applicazione MPR: consente di centrare la glena su 3 piani, selezionando il piano da studiare

Materiali e metodi



MPR = Multi-planar reconstruction
Sistema di postprocessing

Materiali e metodi



Risultati

- 87 pazienti sottoposti a protesi totale di spalla (inversa e anatomica operati dal 1 gennaio 2017 a giugno 2018)
- 6 Tc bilaterali
- 6 pazienti non è stato possibile recuperare TC preop (non presenti nel PACS)
- 10 Tc escluse dal sistema del Blue print (DICOM series non segue i parametri TC del Blue Print 3D planning)
- 77 TC disponibili per lo studio

Risultati

- Test di Wilcoxon: differenza statisticamente significativa per le versioni (p=0,04) tra le 2 misurazioni

- Per quanto riguarda l'inclinazione non c'è differenza statisticamente significativa tra le 2 misurazioni (p=0,24)

Discussione

- Errore del Blue print
- Errore di AF (variabilità intraosservatore e correttezza del piano scapolare selezionato)
- Modalità diversa nell'effettuazione delle misurazioni

Discussione

- “Different studies showed that 2D evaluation regularly understimated retroversion by 15° in A1 and B2 glenoids compared to 3D evaluation”

•Hoenecke H 2010
•Armstrong A 2011

CONCLUSIONI

- L'imaging preoperatorio è fondamentale per definire l'anatomia della spalla, per dare la corretta indicazione chirurgica
- La TC preoperatoria con ricostruzioni 3 D appare essere fondamentale in particolare nelle glene con anatomia piu' distorta
- I software forniti dalle aziende consentono misurazioni 3D e sono "time sparing"
- Le misurazioni fornite dai software sono davvero affidabili????

GRAZIE

THE UPPER LIMB CENTER