

ATLAS

Over the years of our efforts in this field, we have collected an abundance of material, comprising radiographs, CT scans, including 3D documentation, and intraoperative and postoperative photographs documenting in detail individual cases of scapular fractures. Due to limited space, it was not possible to include all the documentation in the text above. However, the saying “A picture is worth a thousand words” applies all the more to traumatology of the musculoskeletal system and we have therefore decided to add a special chapter serving as an atlas, illustrating individual cases of both adult and pediatric scapular fractures in terms of anatomy, classification, operative technique, radiological, CT, functional outcomes and encountered complications:

- » ANATOMY
- » PATHOANATOMY – SIGNIFICANCE OF PILLARS
- » FRACTURES OF THE SCAPULAR BODY
- » FRACTURES OF THE SCAPULAR NECK
- » CLASSIFICATION OF GLENOID FRACTURES
- » FRACTURES OF THE INFERIOR GLENOID
- » TOTAL GLENOID FRACTURES
- » FRACTURES OF SCAPULAR PROCESSES AND ANGLES
- » COMPLEX FRACTURES
- » SCAPULOTHORACIC DISSOCIATION
- » COMPLICATIONS
- » SCAPULAR FRACTURES IN CHILDREN

A TWO-PILLAR FRACTURE OF THE SCAPULAR BODY

Patient: 33-year-old man

Cause: fall from a motorcycle

Injury-to-operation interval: 9 days

Surgical approach: reduced Judet approach with reflection of the deltoid

Follow-up period: 5 years

Result: excellent

Note: This fracture was classified as a two-pillar fracture of the scapular body because the glenoid fragment carried the coracoid as well as the lateral scapular spine, although this cannot be clearly seen on 3D CT reconstructions. Reduction and internal fixation did not require mobilization of the infraspinatus, but merely its retraction. In this case, internal fixation with 2.7-mm implants provided adequate stability.



Fig. 1 Fracture anatomy on 3D CT reconstructions.

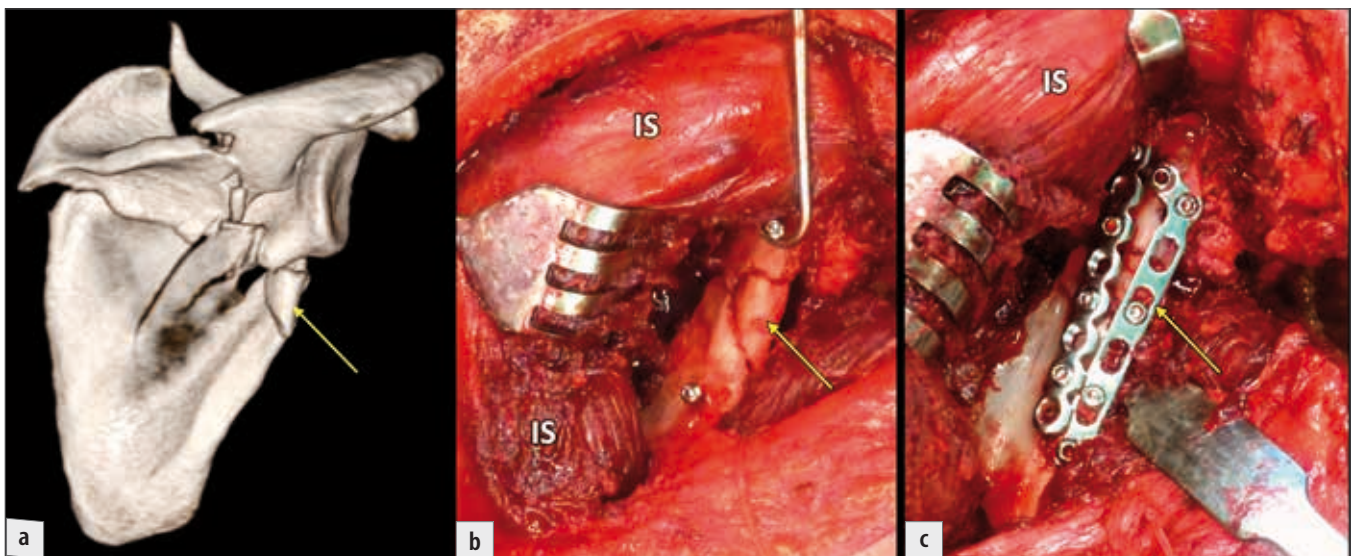


Fig. 2 Reconstruction of the lateral pillar: **a)** 3D CT reconstruction of the fracture from the posterior view; **b)** reduction of the lateral pillar with the use of two bone hooks purchasing on the auxiliary screws; **c)** internal fixation with two plates. IS – infraspinatus. Yellow arrow – intermediate fragment of the lateral pillar.

COPYRIGHTED MATERIAL

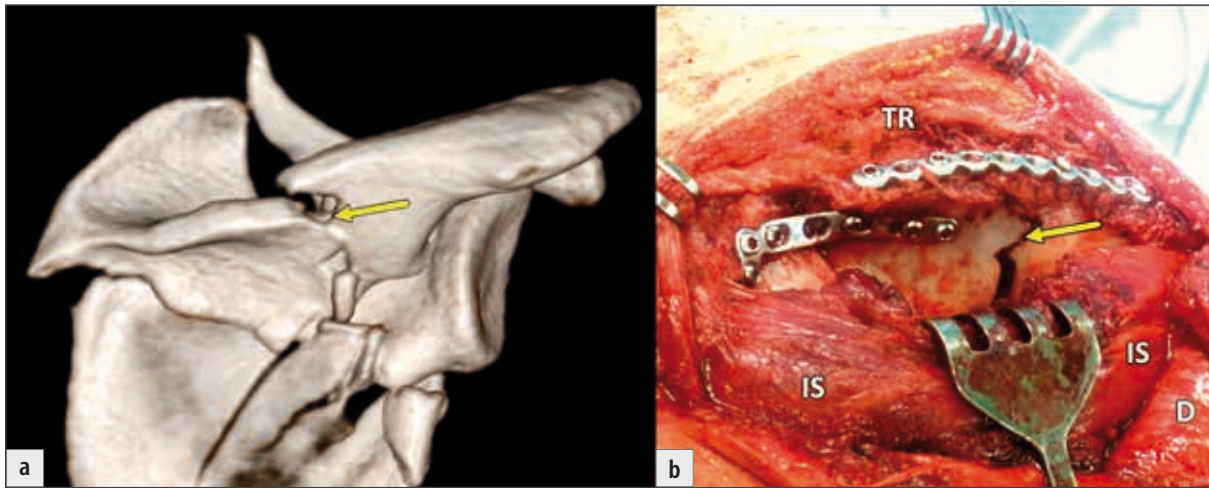


Fig. 3 Reconstruction of the scapular spine (spinal pillar): **a)** 3D CT reconstruction of the fracture from the posterior view; **b)** reduction and internal fixation with two plates. D – deltoid, IS – infraspinatus, TR – trapezius. Yellow arrow – the fracture line passing through the central weakened part of the scapular spine.

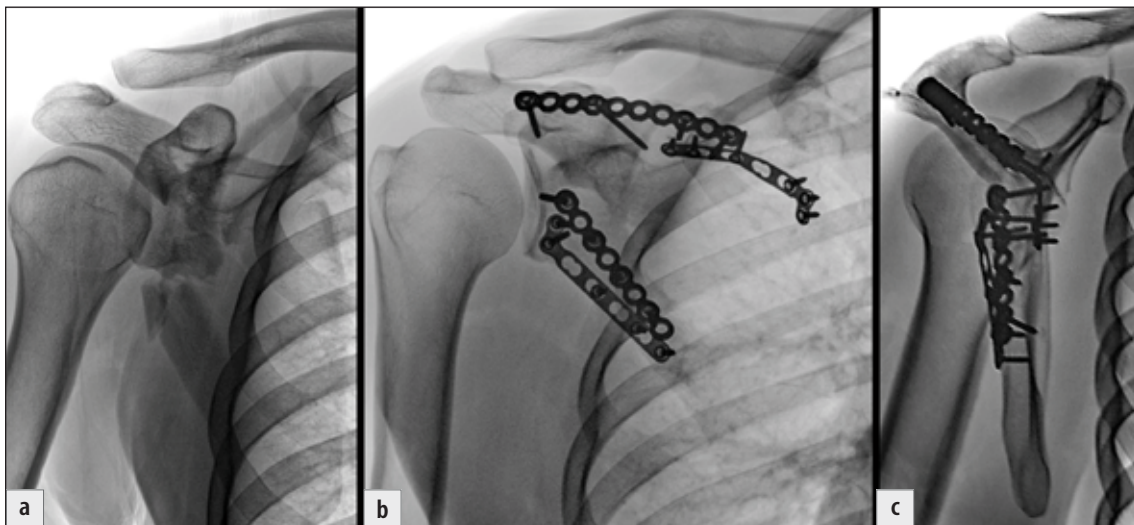


Fig. 4 Radiological follow-up: **a)** post-injury radiograph; **b+c)** postoperative radiographs.

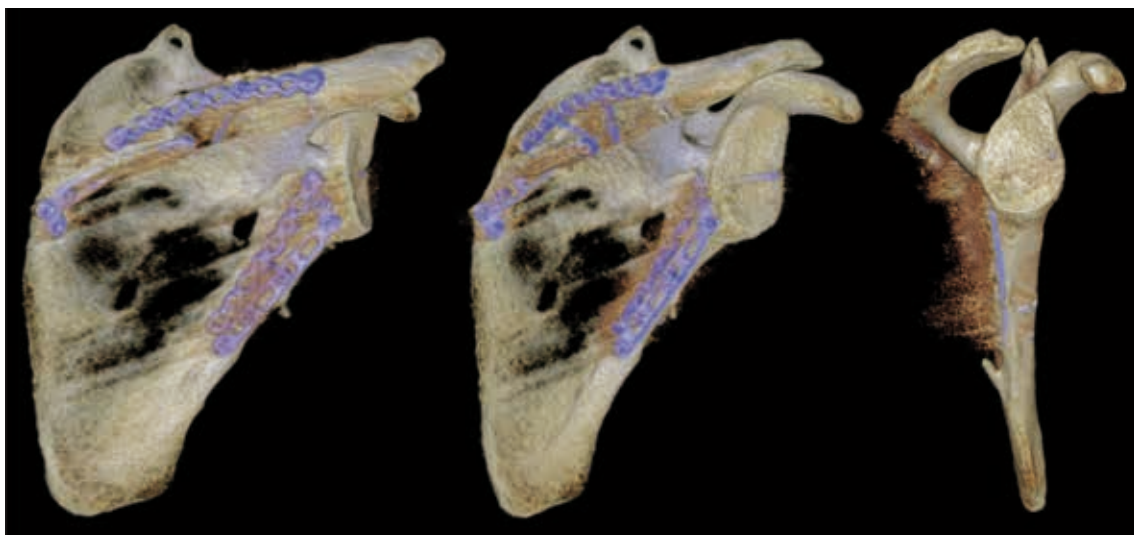


Fig. 5 Follow-up 3D CT reconstructions 5 years postoperatively.

FRACTURES OF THE ANATOMICAL NECK AND OF THE INFRASPINOUS PART OF THE SCAPULAR BODY

Patient: 71-year-old woman

Cause: fall down stairs

Injury-to-operation interval: 17 days

Surgical approach: reduced Judet approach with reflection of the deltoid

Follow-up period: 1 year

Result: excellent

Note: In this case the fracture line passed through the superior rim of the articular surface, which resulted, probably due to the poor bone quality, in separation of a small intermediate fragment. Therefore, it cannot be stated definitively whether it was still a fracture of the anatomical neck, or already a glenoid fracture. Infraspinous fracture of the scapular body in some cases accompanies fracture of the anatomical neck.

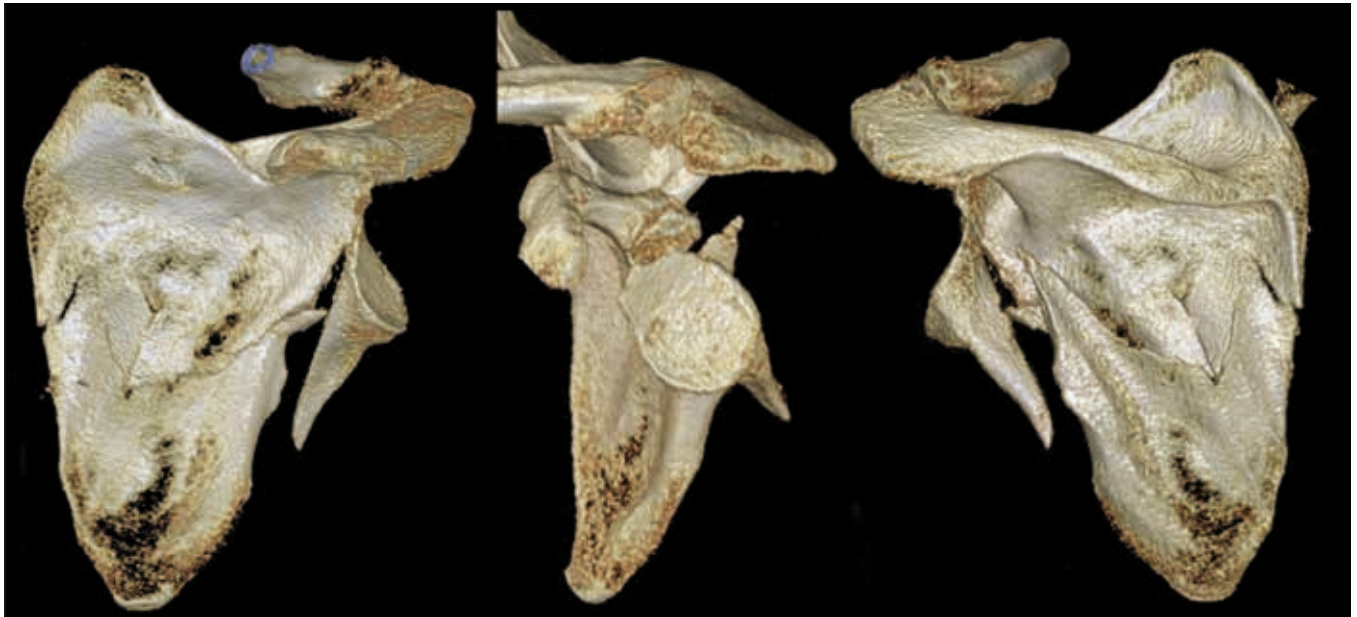


Fig. 1 Fracture anatomy on 3D CT reconstructions.

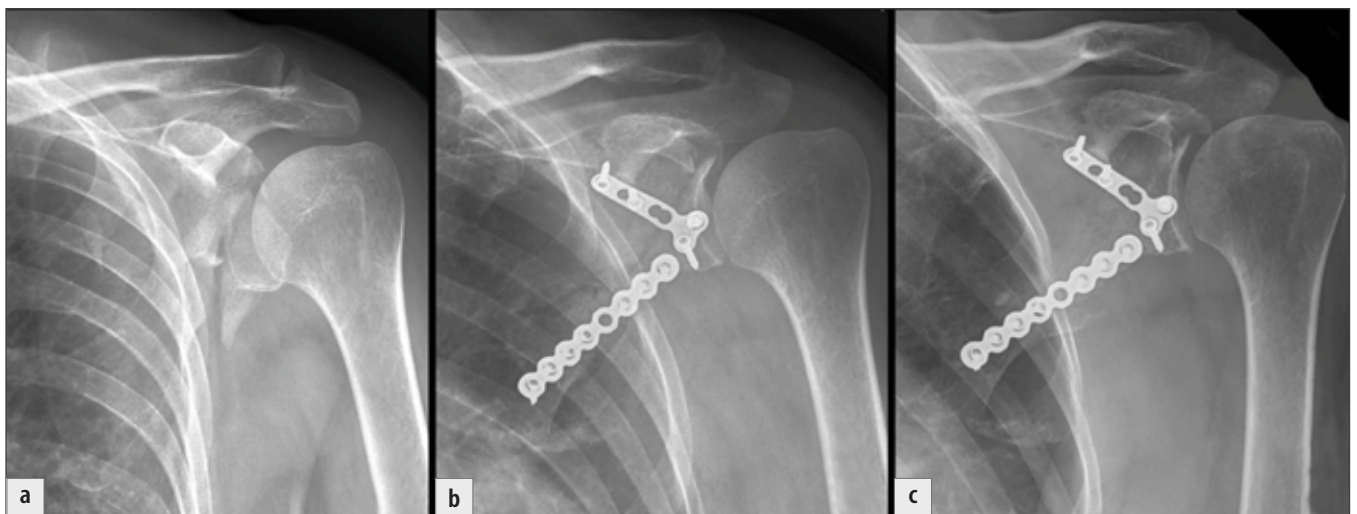


Fig. 2 Radiological outcome of the operation: **a)** post-injury radiograph; **b)** postoperative radiograph; **c)** 1 year postoperatively.

COPYRIGHTED MATERIAL



Fig. 3 Functional outcome 1 year postoperatively. It is evident, that even severe fractures, such as this one, may also be treated operatively in older patients, with an excellent functional outcome.

A FRACTURE OF THE INFERIOR GLENOID AND THE INFRASPINOUS PART OF THE SCAPULAR BODY

Patient: 53-year-old man

Cause: fall from a bicycle

Injury-to-operation interval: 5 days

Surgical approach: Judet approach without reflection of the infraspinatus

Follow-up period: 7 years

Result: excellent

Note: This case documents the effect of the extent of the surgical approach on the speed of restoration of the range of motion. The infraspinatus was not reflected, merely retracted, during operation.

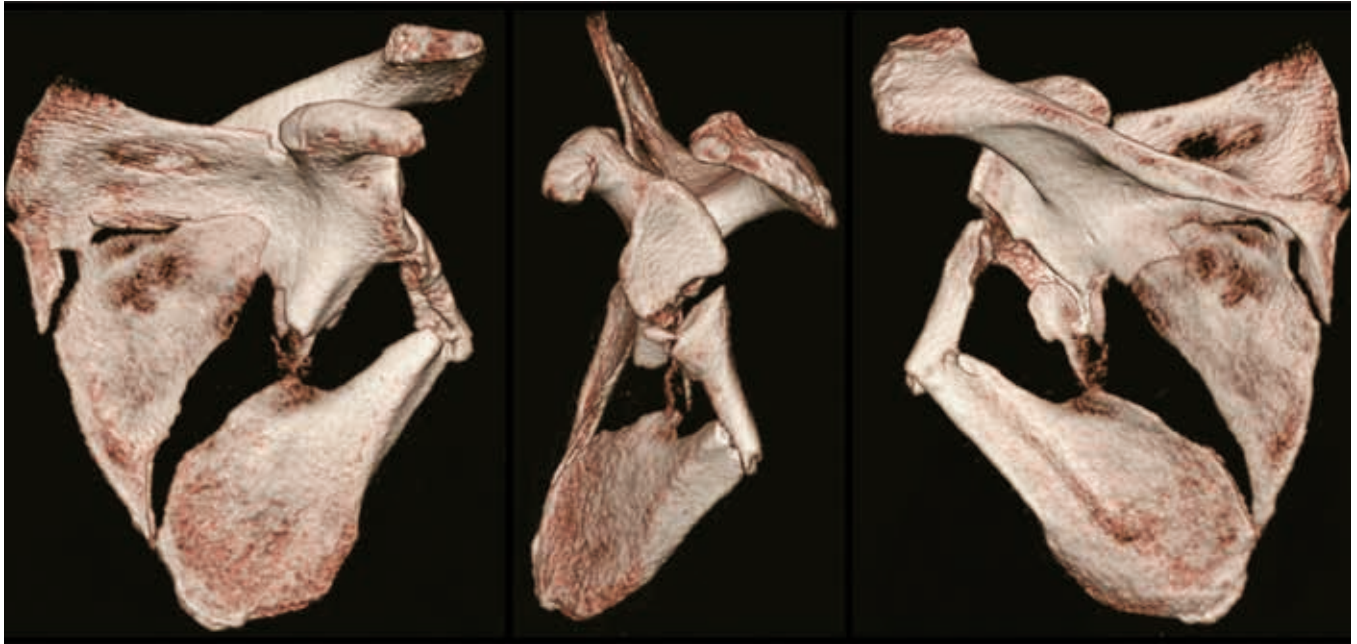


Fig. 1 Fracture anatomy on 3D CT reconstructions.

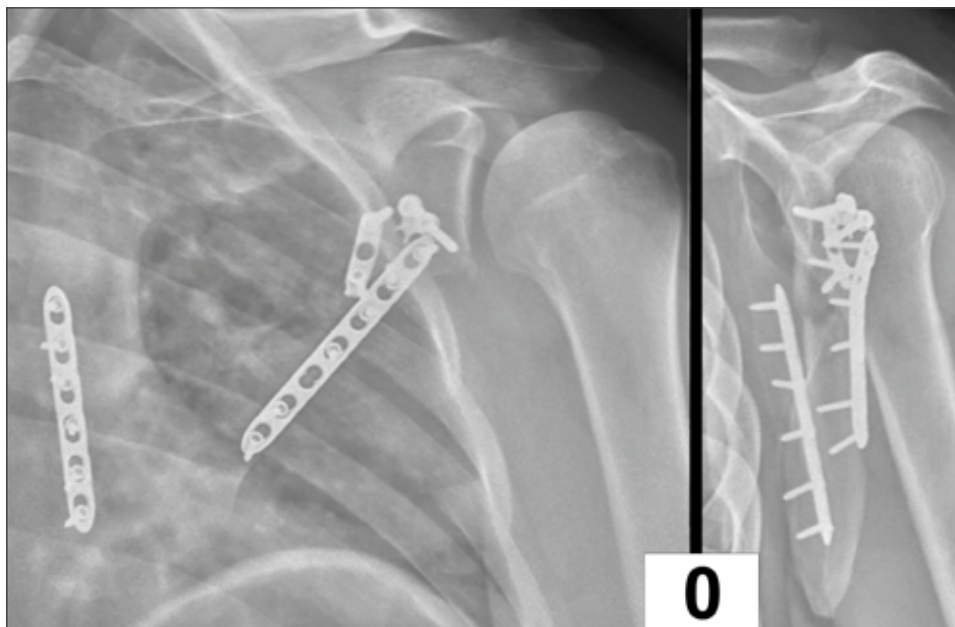


Fig. 2 Postoperative radiographs.

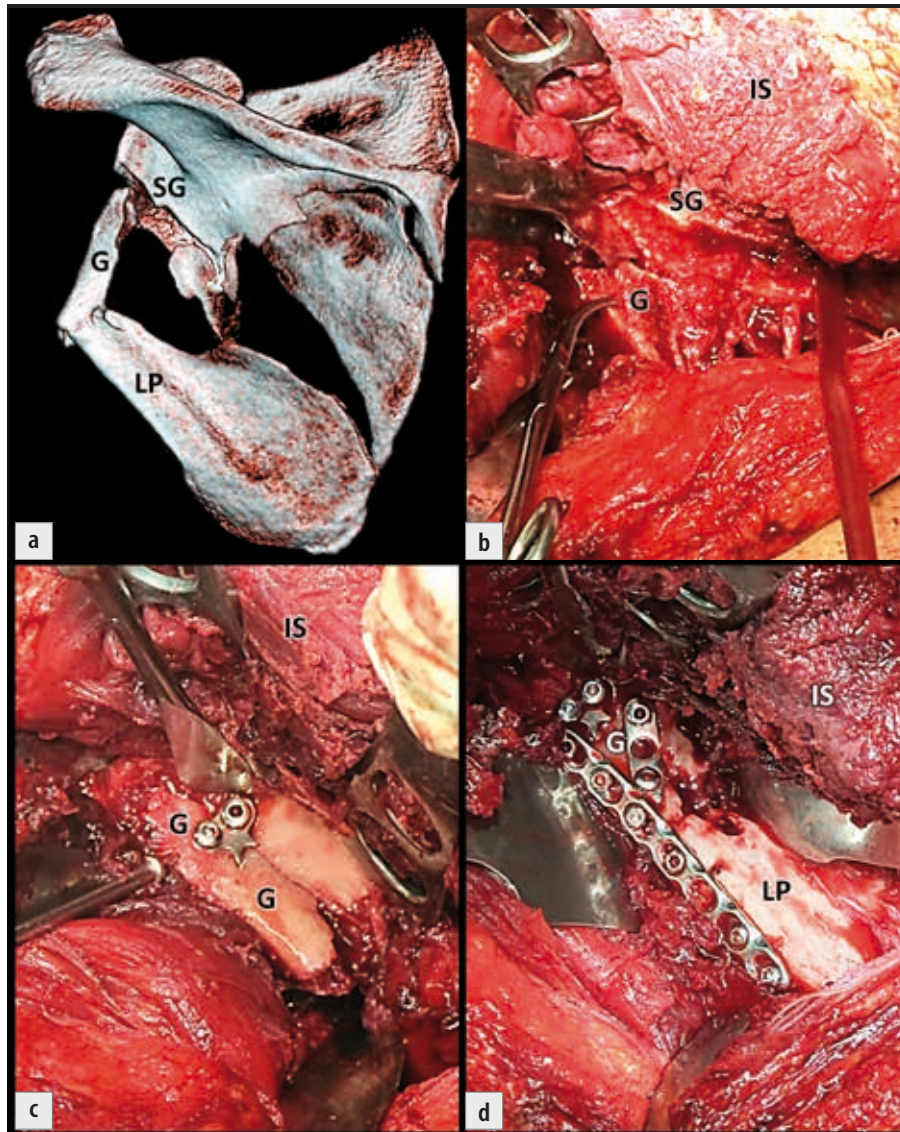


Fig. 3 The course of reconstruction: **a)** 3D CT reconstruction, posterior view; **b)** intraoperative finding after debridement of individual fragments; **c)** reduction and fixation of the inferior glenoid fragment; **d)** completed internal fixation. G – inferior glenoid fragment, IS – infraspinatus, LP – fragment of the lateral pillar, SG – spinoglenoid notch.



Fig. 4 Active range of motion one week postoperatively.

A FRACTURE OF THE INFERIOR GLENOID AND COMMINATION OF THE INFRASPINOUS PART OF THE SCAPULAR BODY

Patient: 55-year-old man

Cause: fall from a bicycle

Injury-to-operation interval: 30 days

Surgical approach: Judet approach with reflection of the infraspinatus

Follow-up period: 15 months

Result: excellent

Note: This patient was operated on as late as 30 days after the injury because other clinical units had recommended non-operative treatment. The operation took almost 4 hours; despite atrophy of the infraspinatus, the functional result has been assessed both subjectively and objectively as excellent.

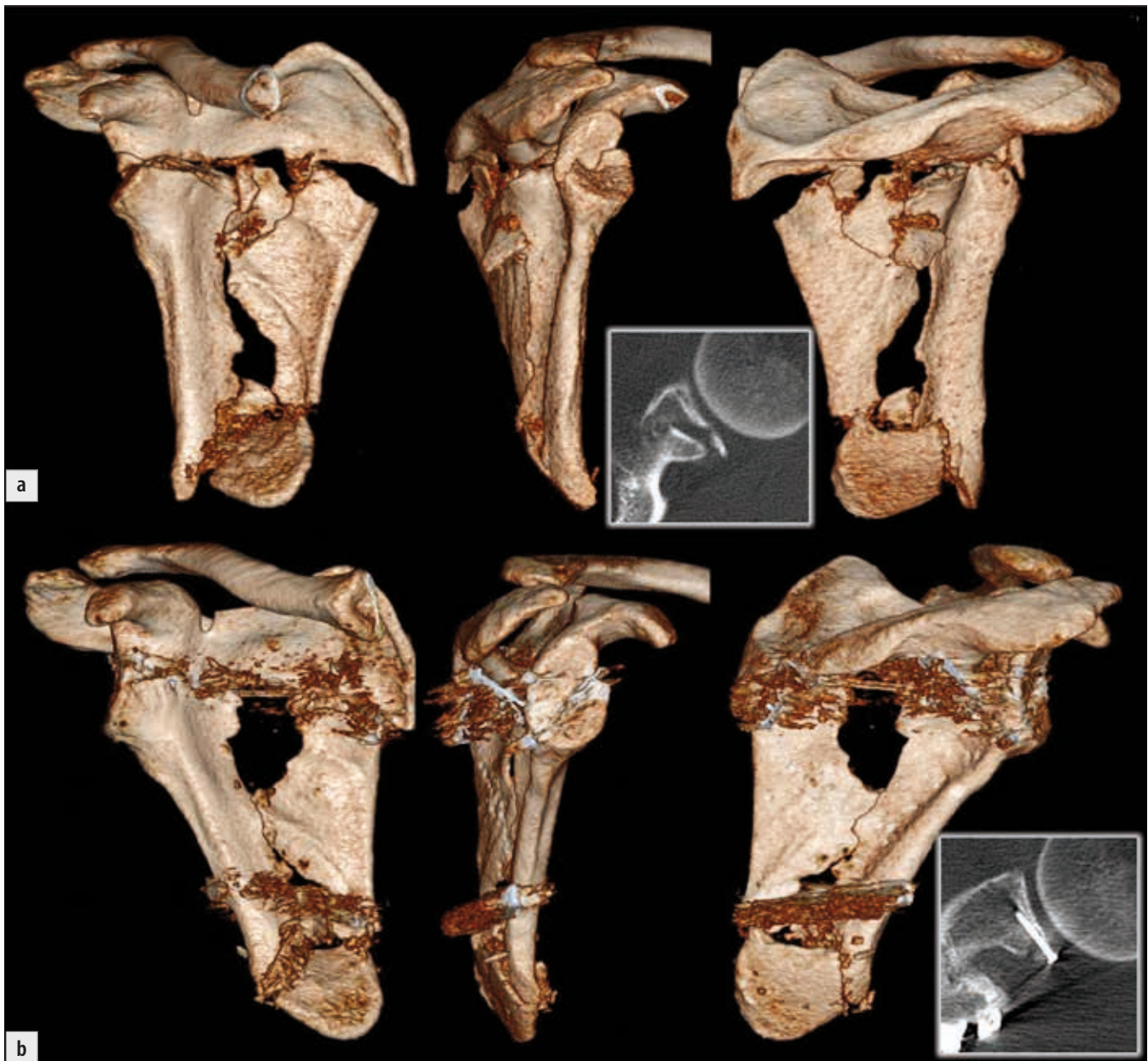


Fig. 1 The fracture on 3D CT reconstructions: **a)** before operation; **b)** after operation.