ARTHROSCOPIC SURGERY IN CASES WITH AN AGING LOCKED POSTERIOR DISLOCATION OF THE SHOULDER

N. Dimitrov, P. Tsekov and B. Matev

Clinic of Surgery of the upper limb
USHATO – "Prof. B. Boychev"

Summary. The shoulder joint is most vulnerable to dislocation. Anterior dislocation is common, while the posterior one is very rare – about 4% of all dislocations of the shoulder. Because of this, the diagnosis is frequently missed at the initial examination – McLaughlin called the situation a "diagnostic trap". The surgical treatment of posterior dislocations initially aimed at reduction of the joint. However, this is not sufficient for aging dislocations. Stability is to be provided. In recent years, the promotion of arthroscopic treatment is becoming increasingly important, especially given for its indisputable advantages. In the Department of Surgery of the Upper Limb in the University Specialized Hospital for Active Treatment in Orthopedics USHATO – "Prof. B. Boychev" for the period 2005-2011, were operated 12 patients (8 men and 4 women – a total of 12 shoulders). All had persistent posterior dislocation of the shoulder as a result of injury, after a lapse of between 3 and 8 months – an average of 4.5 months. In all cases an osteohondral defect from 25 to 45% (average 30%) located on the front surface of the head of the humerus was set. Surgery: Seven patients were first operated through arthroscopic reduction and then stability was restored by transposition of m.subscapularis in the osteohondral defect. Five patients were operated without prior arthroscopic reduction – only through open surgery. Follow-up period was from 6 months to 6 years (3 years averagely). The reported results indicate that abduction, flexion and internal rotation increased much more rapidly and to a larger volume in patients in which first arthroscopic reduction was made, compared with those where it was held via conventional surgery, due to its larger volume and greater operational trauma. These results were also confirmed using two post-operative function of the shoulder joint scoring systems: Murley Constant Score and UCLA.

Key words: *posterior locked luxation of the shoulder, arthroscopic-assisted reduction, stability*

INTRODUCTION

The shoulder joint is most vulnerable to dislocation. Anterior dislocation is common, while the posterior one is very rare – about 4% of all shoulder dislocations.

In 50-80% of cases the diagnosis is omitted at the initial examination due to lack of experience and distinct clinical features – McLaughlin called the situation a “diagnostic trap”.

Therefore, the time between injury and initiation of treatment is quite long. As a result, almost always the patient has already spent more than 3-4 weeks of painful awaiting for the solution of his problem and all, even minimal chances for conservative treatment, have been released long ago.

The first part of the article includes a brief historical, as well as an up-to-date review of the various types of surgery. Some basic pathoanatomical, clinical and radiographic findings, characteristic for posterior dislocation, have also been presented. Our study is presented in the second part of this paper.

HISTORY

In 1839, Sir Ashley Cooper for the first time describes the posterior dislocation of the shoulder joint. In 1855, such injuries were found in a patient after an epileptic seizure. Further on, in 1937, Thomas describes such a patient after an electrical shock.

PATHOANATOMY

Posterior dislocation is often presented with “locked shoulder” with the humeral head perched on the posterior glenoid. More than 50% of cases have an associated impacting osteohondral defect on the anteromedial underside of the head of the humerus – the so called ‘reverse Hill – Sachs lesion’ or ‘McLaughlin – leasion’. This determines the persistent posterior instability. Depending on the size of this defect, different surgical treatment options are indicated. Pathoanatomical features of posterior dislocation of the shoulder are shown in Figures 1a and 1b.

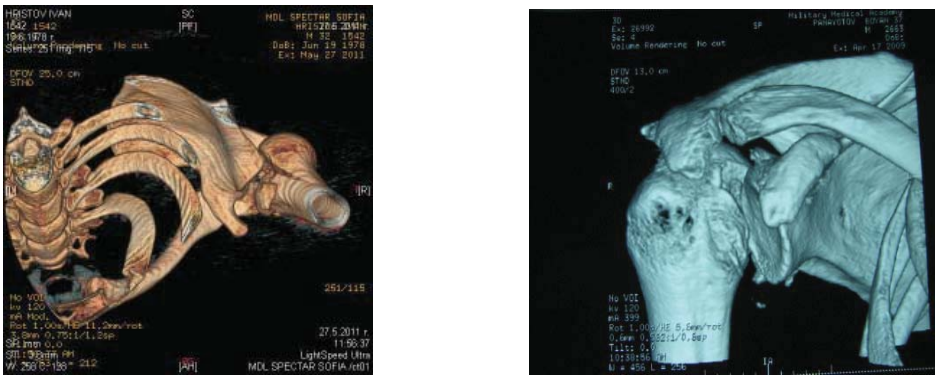


Fig. 1. (a, b) Pathoanatomical features of posterior dislocation of the shoulder

ETIOLOGY AND CLINICAL SIGNS

Some of the most common causes of posterior dislocation are high energy trauma, epileptic seizures and electric trauma.

Clinical Signs

1. Inconclusive clinical signs are:
   – loss of contour of the deltoid;
   – posterior position;
   – soft tissue anterior “gap”;
   – the relative prominence of the proc. coracoideus;
   – elevation – no more than 90°;
   – very limited external rotation;
   – flexible limited internal rotation.
2. Diagnosis is difficult due to the simulated clinical signs of “frozen shoulder”.
3. The standard views of the shoulder, which are used after injury, are required to make the diagnosis of a posterior dislocation. These include an anteroposterior (AP) view and an axillary view. The true AP view is difficult to interpret. Therefore, radiography has limited utility, but would facilitate the initial diagnosis.

Surgery (history)

1. In 1952 McLaughlin and Hill – Sachs developed a surgical method in which a transposition of m. subscapularis and the lesser tuberosity into the humeral defect is made. It is indicated for patients with lesion size 20-40% of the volume of the head of the humerus.
2. Later on, Neer modified the method, making an osteotomy of the lesser tuberosity and then fixing it in the defect, along with the adjacent insertion of m. subscapularis.
3. Hawkins et al. showed success in a series of 4 patients with a defect between 20% and 40%.
4. Walch reported success in 6 patients using this method on identical humeral defects – less than 50%.
5. Finkelstein demonstrated very good results in 7 patients with a defect between 20% and 45%.

All of these studies included patients whose surgery was performed 4 weeks after the trauma.

All are adamant that intervention can be undertaken up to 6 months after injury, but success would be significantly lower. Checcia concluded, that one could count on success up to 2 years between injury and intervention, with very good and excellent results achieved.

Despite the good results, complications may arise due to the extensive nature of the operation in the aging of dislocations and the surgical trauma of the open adhesiolisis needed in order to achieve the reduction.

Checchia shows osteochondritis reported at 3 years follow-up.

One should bear in mind the difficulties in any future joint endoprosthesis, because of the limitation of internal rotation after these interventions.

SURGERY

The aim of surgery is the reduction of the joint. However, this is not enough in the case of aging dislocation. Inner stability is to be provided. Depending on the size of the osteohondral defect, limitation of trauma, and the experience and capabilities of the surgical team, various surgical interventions are known, which could be divided into anatomical and nonanatomical:

1. Open reduction and posterior plication of the capsula following posterior stabilization in patients with defects up to 20%;

2. Transposition of m. subscapularis into the defect with sutures through bone channels (with flaw 20-40%);

3. Neer's modification – osteotomy of the lesser tuberosity and fixation into the defect (Fig. 2a and 2b);

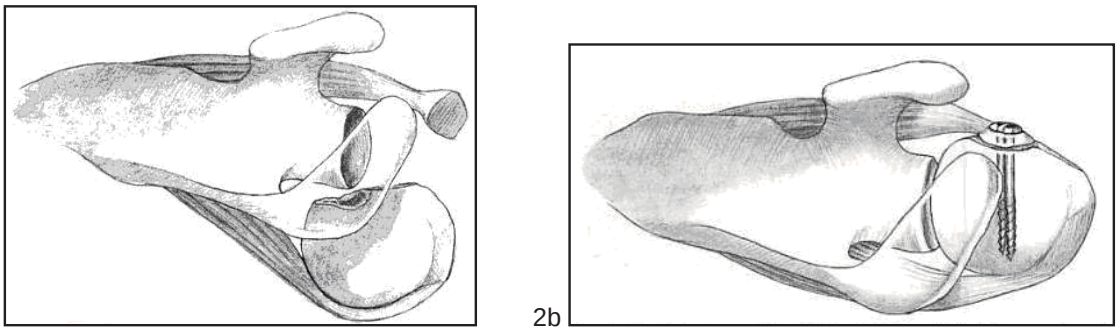


Fig. 2 (a, b) Neer's modification – (a) osteotomy of the lesser tuberosity and (b) fixation into the defect

4. Plication of m. subscapularis and fixing it into the defect by means of anchors without its desinsertion (Charalambous, Ravenscroft) (Fig. 3a and 3b);

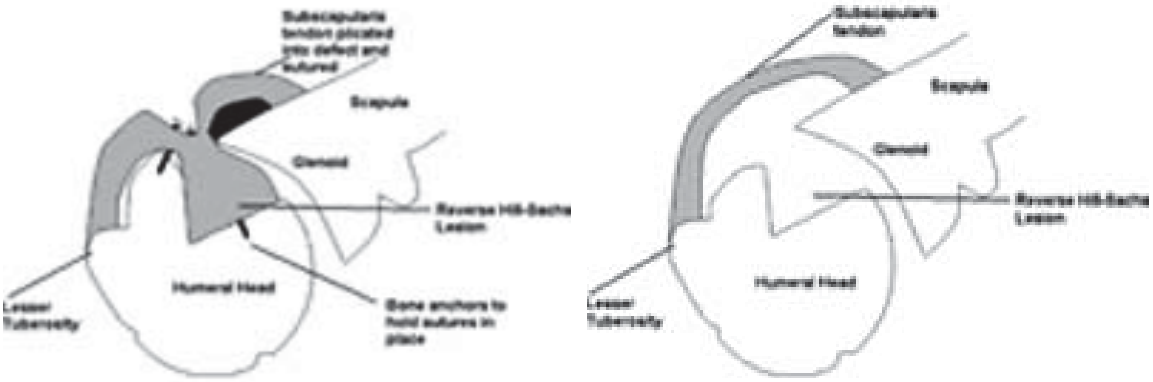


Fig. 3 (a, b) Plication of m. subscapularis and fixing it into the defect by means of anchors without its desinsertion (Charalambous, Ravenscroft)

5. Filling the defect by osteohondral graft (Fig. 4);

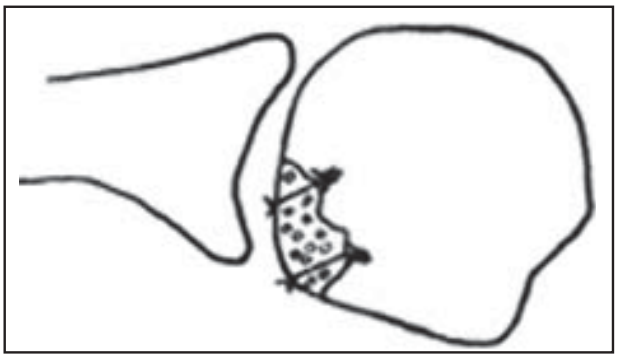


Fig. 4. Filling the defect by osteohondral graft

6. Filling or raising osteohondral impaction for smaller defects (Engel et al.) (Fig. 5a and 5b). The authors indicate that there is a risk of instability of the raised cartilage, which is vulnerable and can easily collapse;

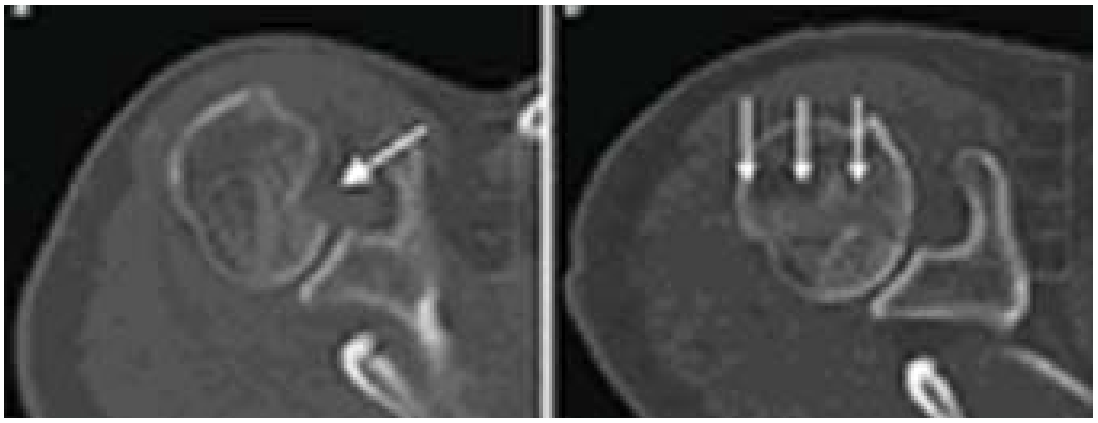


Fig. 5 (a, b) Filling or raising osteohondral impaction for smaller defects (Engel et al.)

7. Recovery of the shape of the head with a bone graft fortified with reconstruction of the posterior capsule (introduced for the first time by Dobousset);

8. Filling the defect with spongios allograft (Gerber – a series of 9 shoulders with a deficit of over 50% – as an alternative to endoprothesis);

9. Transposition of proc. coracoideus defect in more than 50%;

10. In significant defects (50-60%) – endoprosthesis.

ARTHROSCOPIC SURGERY

In recent years, the promotion of arthroscopic treatment, has a growing importance in shoulder surgery, in particular, in restoring stability to the shoulder.

Arthroscopy is of great importance in the treatment of aging posterior locked dislocations. Its great advantages are:

– more accurate view of the joint without extensive open access.

– much more extensive for a good while sparing adhesiolysis:

1. anterior – front release of fibrosis which provides space for reduction;

2. posterior – a strong reduction of rigidity, which can provide a sufficient volume of abduction and external rotation necessary for reduction without tension – which limits further increase of the defect during the intervention.

– a sufficient posterior stabilization by means of anchors, a placation of posterior capsule, when the defects are less than 15-20%.

– arthroscopic- assisted reduction in aging posterior locked dislocations limits the trauma of the intervention and thus has a great advantage as a first stage of the operation.

– subsequent stabilization at more than 20% defects is achieved through minimal surgical approach.

MATERIALS AND METHODS

In the Department of Surgery of the Upper Limb in the University Specialized Hospital for Active Treatment in Orthopedics USHATO – "Prof. B. Boychev" for the period 2005 – 2011, were operated 12 patients (8 men and 4 women – a total of 12 shoulders). All had persistent posterior dislocation of the shoulder as a result of injury, after a lapse of between 3 and 8 months – an average of 4.5 months. In all cases an osteohondral defect from 25 to 45% (average 30%) located on the front surface of the head of the humerus was set.

In all cases the humeral head "mounted her" posterior glenoid was visualized by CT or MRI examinations.

Clinical findings were as follows:

– abduction:
  – 70° – very painful in 5 patients;
– elevation:
  – 50° – 4 patients;
  – 80° – in 6 patients;
  – 90° – in 1 patient;
  – 100° – in 1 patient;
– external rotation:
  – up to pelvis – springy in 8 patients;
  – impossible in 4 patients.

Radiographic findings:

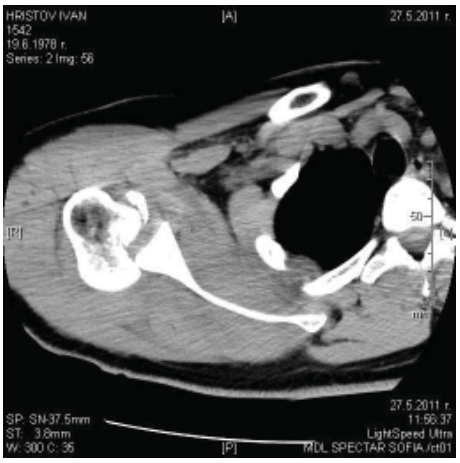
– abnormal contour overlaps the joint profit in AP view (Fig 6a);
– impossible axillary view (Fig 6b).

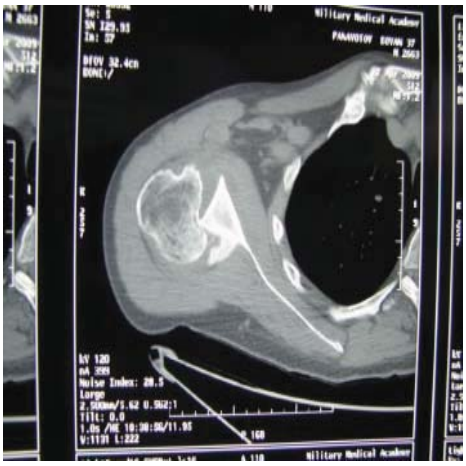
6a 

6b 

Fig. 6 (a, b) An anteroposterior (AP) view (a) and an impossible axillary view (b)

The CT scan shows a middle range deficit of the defect of the humeral head in 10 patients (Figures 7a, 7b, 7c and 7d).

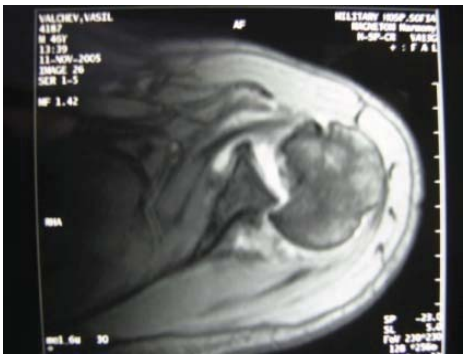
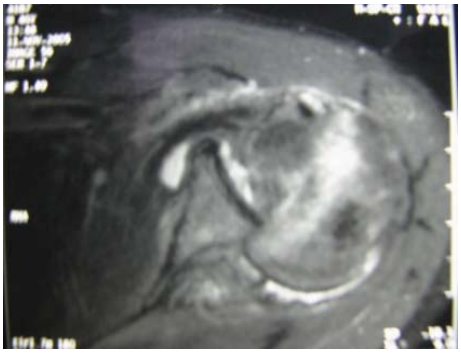
7a 

7b 

7c 
7d 

Fig. 7 (a, b, c, d) CT scan of the humeral head defect

MRI shows the same range deficit in 2 patients (Fig. 8 a, b, c, d).

8a  8b 

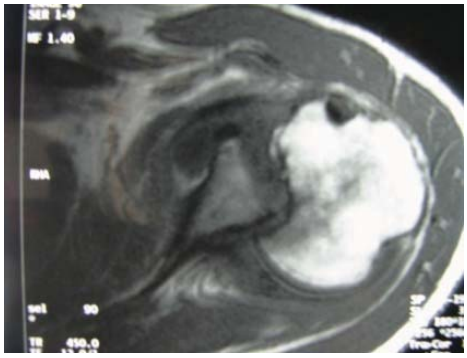
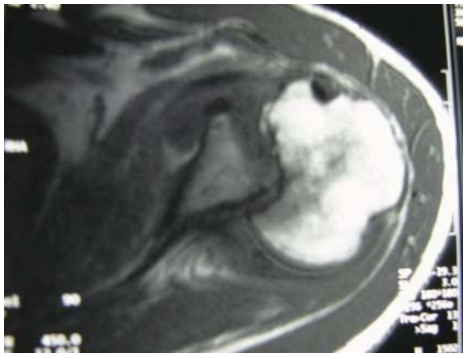
8c  8d 

Fig. 8 (a, b, c, d) MRI of the same humeral head defect in 2 patients

Operatively:

– 7 patients were operated by:

– I stage

1. arthroscopic adhaesiolysis by anterior, posterior and inferior capsulotomy;
2. arthroscopic assisted reduction;
3. arthroscopic posterior stabilisation in 3 patients.

– II stage – to restore stability by transposition of m. subscapularis in the osteohondral defect;

– 5 patients were operated without prior arthroscopic reduction – only through the restoration of stability through transposition of m. subscapularis in the osteohondral defect.

Surgical techniques:

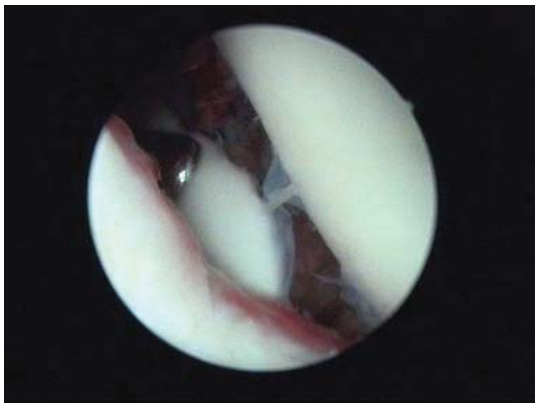
I. Arthroscopic surgical techniques:

1. Arthroscopic diagnosis (Fig. 9 a,b,c,d):

– lateral position of the patient;

– anterior and posterior adhaesiolysis;

– demonstrate the size of the defect of humeral head.

9a  9b 

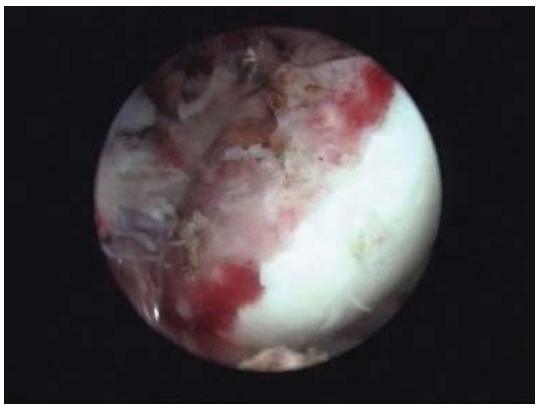
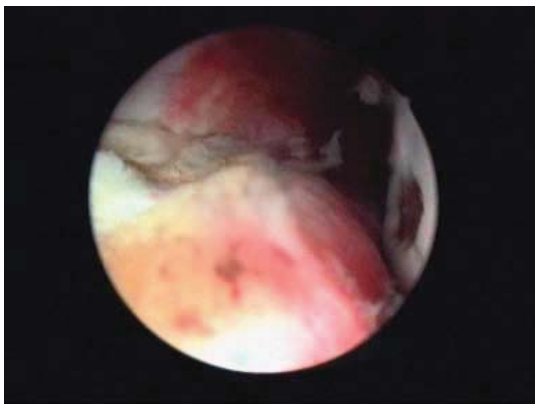
9c  9d 

Fig. 9 (a, b, c, d) Arthroscopic diagnosis

2. Arthroscopic assisted reduction (Fig. 10 a and b).

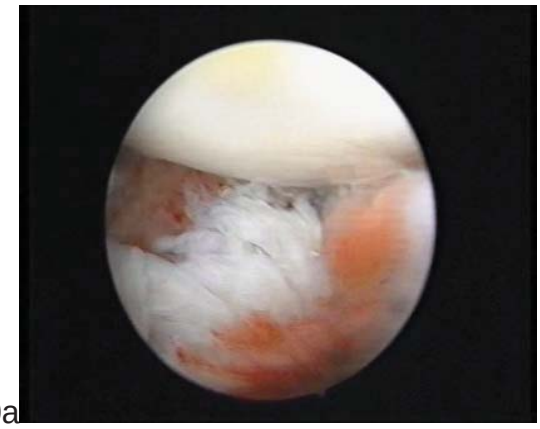
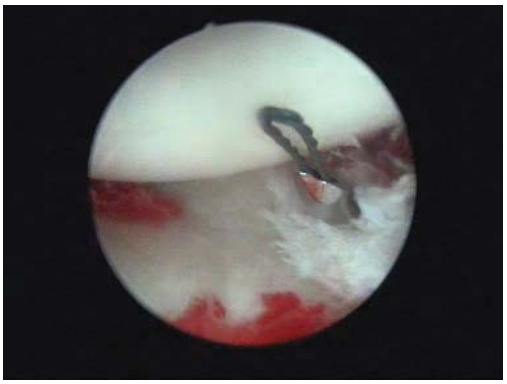
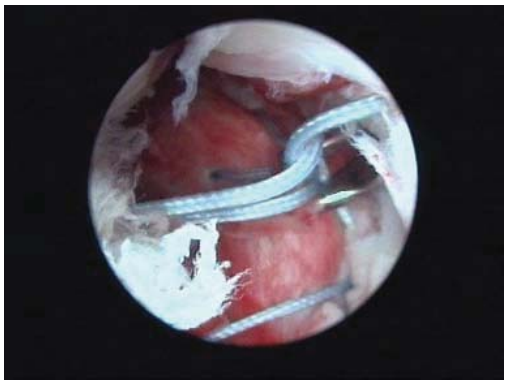
10a  10b 

Fig. 10 (a, b) Arthroscopic assisted reduction

3. Arthroscopic posterior stabilisation by means of anchors, extracapsular sutures, or plication of the posterior capsule (Fig. 11 a, b, c, d).

11a  11b 

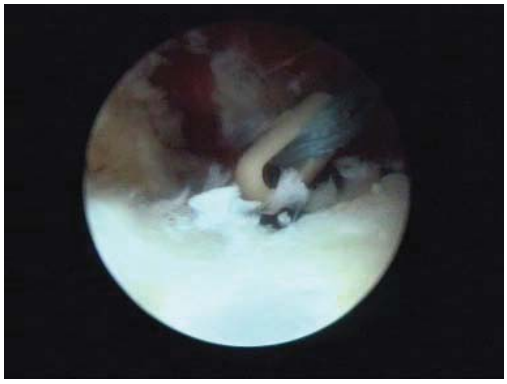
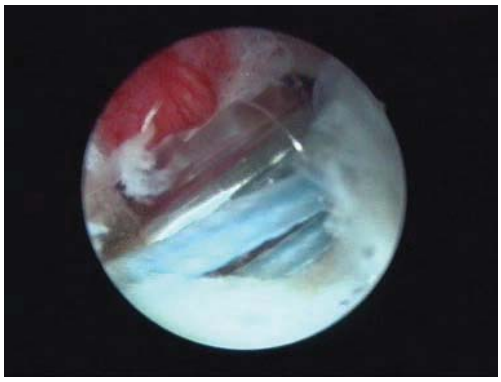
11c  11d 

Fig. 11 (a, b, c, d) Arthroscopic posterior stabilisation by means of anchors, extracapsular sutures, or plication of the posterior capsule

Thus was prepared the second stage – minimally invasive surgery.

Postoperative results:

Up to 4-th week – brace in abduction:

- abduction 15°;
- neutral in terms of rotation;
- flexion of 5°-10°

5-th week – passive movements:

- circumduction;
- abduction – up to 60°;
- flexion up to 80°;
- external rotation up to 0°;
- no internal rotation.

After 5 th week – start of active movements:

- increase the amount of abduction and flexion;
- external rotation to 20°;
- without internal rotation.

After 2 months – stretching – exercises.

Minimum period of kinesitherapy – 3 months.

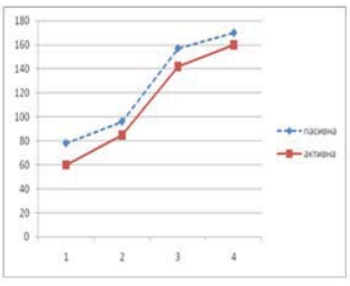
RESULTS

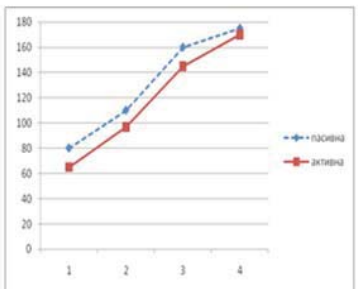
The follow-up period was between 6 months and 6 years – an average of 3 years. Table 1. Shows the increase in the volume of motions with time:

Table 1. Shoulder range of motion – functional outcome at 4th week, 12th week and 1 year

Study		Min.	Max.	x	S
Passive abduction	4 w 12 w 1 y	65 135 160	80 180 180	71 157 170	12.4 8.7 9.1
Active abduction	4 w 12 w 1 y	45 120 145	95 160 180	84 142 160	13.7 9.5 8.4
Passive flexion	4 w 12 w 1 y	65 120 160	100 160 180	89 135 175	12.1 10.2 8.4
Active flexion	4 w. 12 w 1 y	65 120 155	110 165 180	97 145 170	10.8 7.5 6.3
Internal rotation	4 w 12 w 1 y	5 30 70	5 35 90	5 31 80	9.1 5.2 3.4
External rotation	4 w 12 w 1 y	0 35 50	25 60 80	15 45 60	6.1 7.2 5.9

In patients with prior arthroscopic reduction, abduction (Fig. 12a), flexion (Fig. 12b) and internal rotation (Fig. 12c) increased as follows:





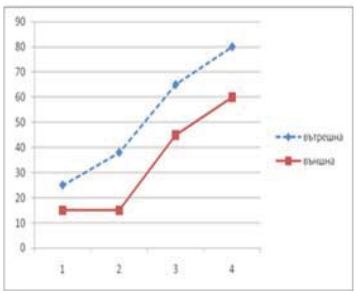


Fig. 12 a. abduction 12b. flexion 12c. internal rotatio

In patients without prior arthroscopic reduction, abduction, flexion and internal rotation grew more slowly and for a longer period (Fig. 13 a,b,c,d):

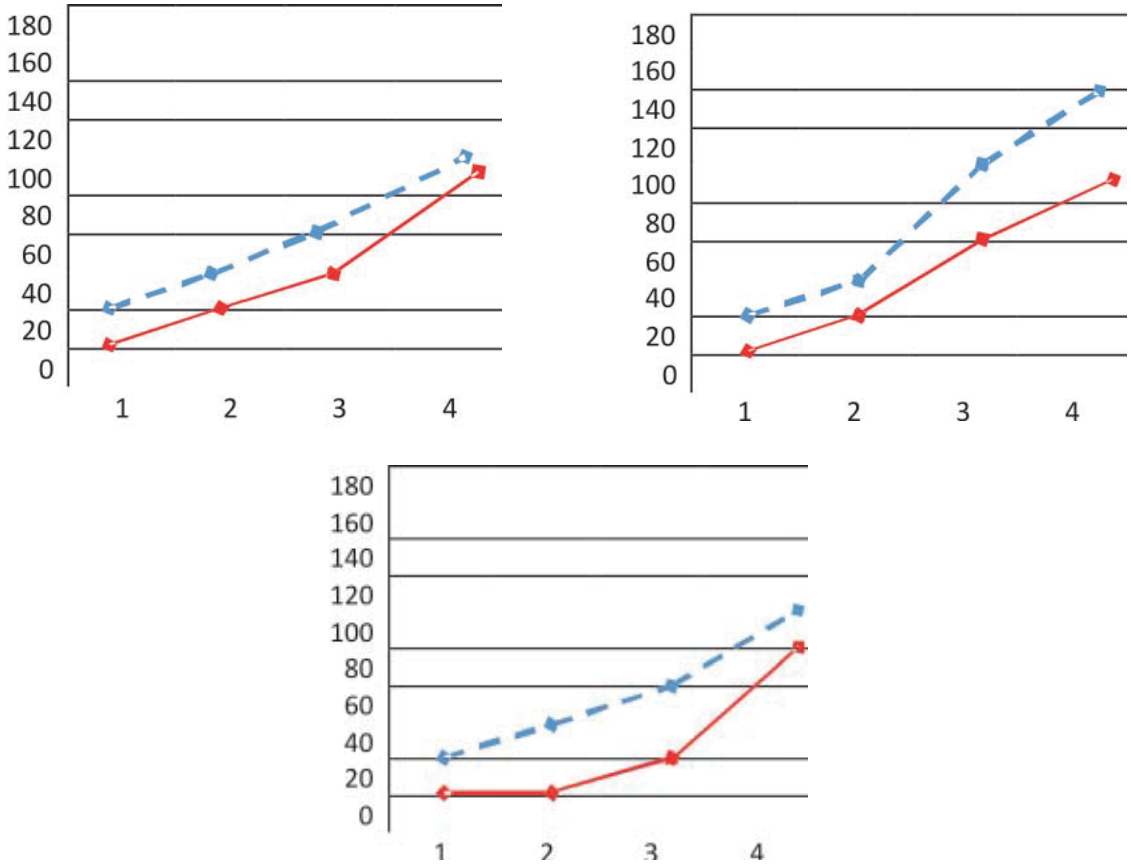
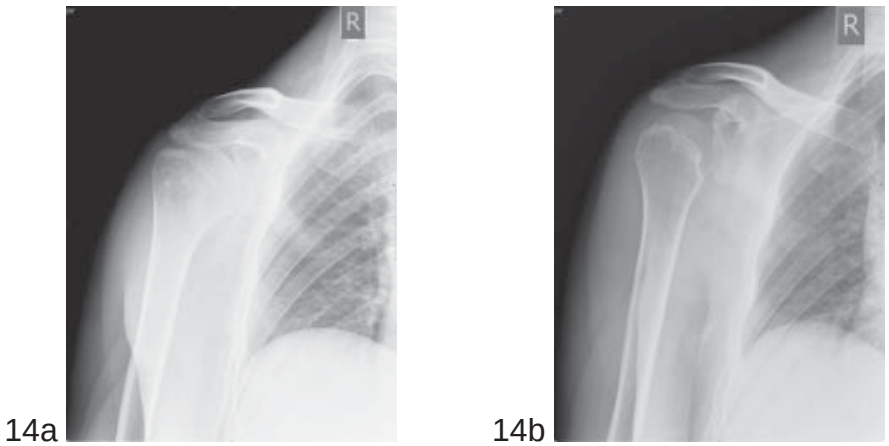


Fig. 13. (a, b, c, d) In patients without prior arthroscopic reduction, abduction, flexion and internal rotation grew more slowly and for a longer period

X-ray – postoperatively – 5th month (Fig. 14 a, b):



14a 14b

Fig. 14 (a, b) X-ray findings five months after the sugrery

X-ray – postoperatively – 6th year (Fig. 15 a,b):

15a  15b 

Fig. 15 (a, b) X-ray 6th year

CT – postoperatively (Fig. 16 a,b):

16a 

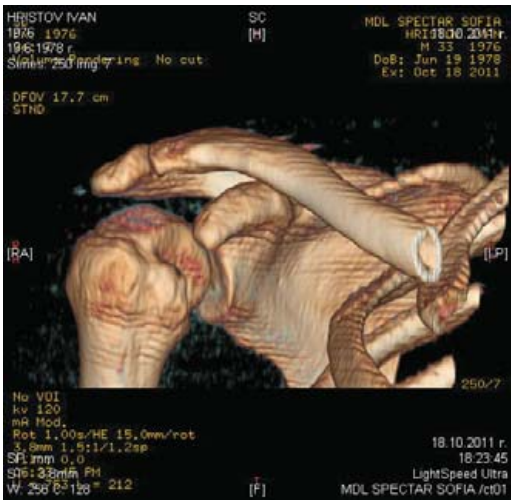
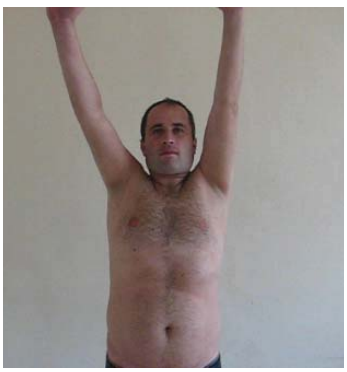
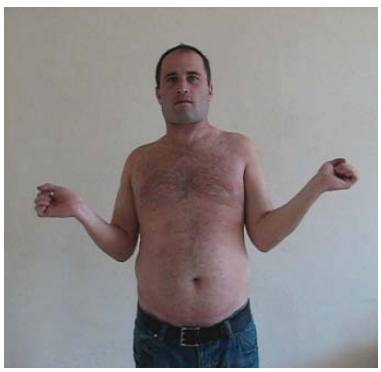
16b 

Fig. 16 (a, b) CT scan – postoperative results

Clinically – postoperatively – 5 months (Pic. 1 a, b, c):


Pic. 1 (a, b, c)

– Clinical – postoperatively – 6 years (Pic. 2 a, b. c):

Pic. 2 (a, b, c)

– **Murley Constant Score**

Mean Constant Murley Score – 19p – pre-operatively.

Mean Constant Murley Score – **82p – postoperatively** – after 2 months in 7 patients **after** prior arthroscopic reduction

Mean Constant Murley Score – **61p – postoperatively** – after 2 months in 5 patients **without** a prior arthroscopic reduction

– **UCLA**

Average UCLA – Score – 8p – preoperatively

Average UCLA – Score – **25p – postoperatively** – after 2 months in 7 patients **after** prior arthroscopic reduction

Average UCLA – Score – **18p – postoperatively** – after 2 months, in 5 patients **without** a prior arthroscopic reduction

Similarity between our results and the reports of some authors was found:

– Peter Bock and Rainer Kluger – 5 years follow up in 6 patients – CS – 88.2p (average) – 2 – with excellent, 4 – with good results.

– Haukins – 2 years. follow-up in 4 patients – CS – 80p average).

– Walch – 3 years. follow-up in 6 patients (up to 50% defect) – CS – 75p (average)

– Finkelstein – 3 years. follow-up in 7 patients – CS – 78p (average)

– Christopher and Craig – 4 years. follow-up in 9 patients – UCLA (21-29p)

– Gavrilidis and Magosch – 4-years-follow-up in 11 patients – CS – 72p (average)

– **Complications**:

– expressed arthrosis in 1 patient, who, however, has very good movements;

– very limited external rotation up to 20° in 1 patient

DISCUSSION

Arthroscopic surgical treatment of aging posterior locked dislocation of the shoulder:

– stores the maximum and the anatomy of the joint which is so altered:

1. by arthroscopic adhaesiolysis;
2. by means of most gentle reduction without tension, arthroscopically secured.

– provides accurate arthroscopic assessment of the size of the defect of the head of the humerus and helps select the most accurate plan for the second stage of the intervention;

– provides another opportunity for stabilization through by means of anchors or plication of the posterior capsule, which may be sufficient for small defects – to 15-20%;

– minimizes the surgical access to the second stage of intervention, because of lack of need for large, open adhaesiolysis as a purpose of the reduction;

– shortening the time for the second stage – open surgery – reducing the possibility of complications;

– permits abduction, flexion and internal rotation to be increased much more rapidly and to much larger volume in patients in which first arthroscopic reduction was made, compared with those where it was held only via conventional surgery.

CONCLUSION

Arthroscopic surgical treatment of aging posterior locked shoulder dislocations can enter into consideration after an accurate indication of its performance in the presence of an operating team, familiar with the method.

The reported results indicate that abduction, flexion and internal rotation increased much more rapidly and to much larger volume in patients in which first arthroscopic reduction was made, compared with those, where it was held via conventional surgery, because of its larger volume and greater operational trauma.

REFERENCES

1. Blasier, R. B. et J. K. Burkus.Management of posterior fracture-dislocations of the shoulder. – Clin. Orthop. Relat. Res., **232**, 1988, 197-204 .
2. Cheng, S. L. et al. Treatment of locked posterior fracture-dislocations of the shoulder by total shoulder arthroplasty. – J. Should. Elb. Surg., **6**, 1997 , № 1, 11-17 .
3. Gerber, C. et S. M. Lambert. Allograft reconstruction of segmental defects of the humeral head for the treatment of chronic locked posterior dislocation of the shoulder. – J. Bone. Jt. Surg., **78**, 1996, № 3, 376-382 .
4. Brown, R. J. Bilateral dislocation of the shoulders. – Injury, **15**, 1984, № 4, 267-273.
5. Kelly, J. P. Fractures complicating electro-convulsive therapy and chronic epilepsy. – J. Bone Joint Surg. Br., **36-B**, 1954, № 1, 70-79 .
6. Mestdagh, H. et al. Traumatic posterior dislocation of the shoulder in adults. Apropos of 25 cases. – Ann. Chir., **48**, 1994, № 4, 355-363.
7. Hawkins, R. J. et al. Locked posterior dislocation of the shoulder. – J. Bone Joint Surg., **69**, 1987, № 1, 9-18 .

8. C o o p e r , A. On the dislocations of the os humeri upon the dorsum scapulae, and upon fractures near the shoulder joint. – Guy's Hosp. Rep., **4**, 1839, 265-284 .
9. E n g e l h a r d t , M. B. Posterior dislocation of the shoulder: report of six cases. – South. Med. J., **71**, 1978, № 4, 425-427.
10. D o r g a n , J. A. Posterior dislocation of the shoulder. – Am. J. Surg., **89**, 1955, № 4, 890-900.
11. R o w e , C. R. et B. Zarins. Chronic unreduced dislocations of the shoulder. – J. Bone Joint Surg., **64**, 1982, № 4, 494-505.
12. H i l l , N. A. et L. H. Mc. Locked posterior dislocation simulating a 'frozen shoulder'. – J. Trauma, **3**, 1963, 225-234 .
13. M c L a u g h l i n , H. L. Dislocation of the shoulder with tuberosity fracture. – Surg. Clin. North. Am., **43**, 196, 31615-1620.
14. I r l e n b u s c h , L. et al. Possibilities for the operative treatment of traumatic posterior shoulder dislocation. – Unfallchirurg, 111, 2008, № 6, 464-468.
15. O ' C o n n o r , S. J. et A. S. Jacknow. Posterior dislocation of the shoulder. – AMA Arch. Surg., **72**, 1956, № 3, 479-491.
16. W i l s o n , J. C. et K. F. Mc. Traumatic posterior dislocation of the humerus. – J. Bone Joint Surg. Br., **31A**, 1949, № 1, 160-172.
17. H u g h e s , M. et C. S. Neer II. Glenohumeral joint replacement and postoperative rehabilitation. – Phys. Ther., **55**, 1975, № 8, 850-858.
18. M c L a u g h l i n , H. Posterior dislocation of the shoulder. – J. Bone Jt. Surg., **24-A-3**, 1952, 584-590.
19. G a v r i i l i d i s , I. et al. Chronic locked posterior shoulder dislocation with severe head involvement. – Int. Orthop., **34**, 2010, № 1, 79-84.
20. S e y b o l d , D. et al. A new method of closed reduction of locked posterior shoulder dislocation. – In: Paper presented at the Congress of the German Association of Shoulder and Elbow Surgery (DVSE), 2007.
21. I t o i , E. et al. Position of immobilization after dislocation of the shoulder. A cadaveric study. – J. Bone Jt. Surg., **81**, 1999, № 3, 385-383.
22. K i r c h h o f f , C. et al. Traumatic posterior shoulder dislocation: diagnosis and therapy. – Unfallchirurg, **110**, 2007, № 12, 1059-1064.
23. M a l g a i g n e , J. F. Traité des Fractures et Luxationes. – JB. Bailliere, Paris, 1855.
24. D i k l i c , I. D. et al. Treatment of locked chronic posterior dislocation of the shoulder by reconstruction of the defect in the humeral head with an allograft. – J. Bone Joint Surg. Br., **92**, 2010, № 1, 71-76.
25. S p e r l i n g , J. W. et al. Shoulder arthroplasty for locked posterior dislocation of the shoulder. – J. Should. Elb. Surg., **13**, 2004, № 5, 522-527.
26. S p e n c e r , E. E. Jr et J. J. Brems. A simple technique for management of locked posterior shoulder dislocations: report of two cases. – J. Should. Elb. Surg., **14**, 2005, № 6, 650-652.

Address for correspondence:
B. Matev, DM
Clinic of Surgery fo the Upper Limb
USHATO – "Prof. B. Boychev"
56 Nikola Petkov blvd.
1614 Sofia, Bulgaria
02/81-81-622
0888 46 11 75
e-mail: bimatev@abv.bg