# POSTERIOR APROACHES IN DISTAL HUMERUS FRACTURES BRYAN – MORREY APPROACH VERSUS TRANSOLECRANIAN APPROACH

**B. CIUBARĂ [1], C. IANCU[2], O. ALEXA[3]**

[1,2,3] *University of Medicine and Pharmacy "Gr. T. Popa" Iaşi*

***Keywords:*** *distal humerus fractures, ORIF, Brayan - Morrey approach, transolecranian approach*

***Abstract:*** *This study tries to analyze replacement opportunity of the transolecranian approach with Brayan - Morrey approach (4.7) in view of anatomical, functional and biomechanical changes that apear to the elbow joint after transolecranian approach (angulation, translation and diastasis). After surgery patients were enrolled in an intensive functional rehabilitation program (3), being re-evaluated at 2 weeks, 4 weeks, 2 months, 3 months, 6 months and 1 year. At each visit patients were investigated radiologically and functionally (flexion, extension, pronation, supination, grip strength – gripping). Evaluation of the patients was done according to the sheet of the patient with distal humerus fracture; elbow Mayo score and gripping ability. From a functional point, the patients who were operated by Brayan - Morrey approach perform better and faster than those who were operated by classical transolecranian approach. Given the issues described above, for type C fractures of the distal humerus, personally consider to be appropriate to replace the transolecranian approach with Brayan - Morrey approach.*

***Cuvinte cheie:*** *fractura humerusului distal, tratament chirurgical, abord Brayan – Morrey, abord transolecranian*

***Rezumat:*** *Prezentul studiu încearcă să analizeze oportunitatea înlocuirii abordului transolecranian cu abordul Brayan – Morrey (4,7) având în vedere modificările anatomice, funcţionale şi biomecanice care apar la nivelul articulaţiei cotului în urma abordului transolecranian (angulaţia, translaţia şi diastazisul). Postoperator pacienţii au fost incluşi într-un program intensiv de reabilitare funcţională (3), fiind reevaluaţi la 2 săptămâni, la 4 săptămâni, la 2 luni, la 3 luni, la 6 luni şi la 1 an. La fiecare vizită pacienţii au fost investigaţi radiologic şi funcţional (flexie, extensie, pronaţie, supinaţie, prehensiune). Evaluarea pacienţilor a fost făcută conform fişei de urmărire a pacientului cu fractură de humerus distal, scorului MAYO şi capacităţii de prehensiune. Din punct de vedere funcţional remarcăm că pacienţii care au fost operaţi prin abord Brayan – Morrey au rezultate mai bune şi mai rapide decât cei care au fost operaţi prin abordul clasic transolecranian. Având în vedere aspectele descrise anterior, pentru fracturile tip C ale humerusului distal, personal considerăm ca fiind oportună înlocuirea abordului transolecranian articular cu abordul Brayan – Morrey.*

## INTRODUCTION

This study tries to analyze replacement opportunity of the transolecranian approach with Brayan - Morrey approach (4.7) in view of anatomical, functional and biomechanical changes that apear to the elbow joint after transolecranian approach (angulation, translation and diastasis). Fractures included in this study are part of the fracture type C.1, C.2, C.3 AO (Arbeitsgemeinschaft für Osteosynthesefragen) classification

## MATERIAL AND METHOD

The study was conducted on a group of 32 patients over a period of 18 months. Patients were balanced distributed each surgical technique, respectively 16 patients. For each group the distribution was 5 cases for the fracture type C.1 and C.2 and for the C.3 fractures, 6 cases. Selection of patients for each surgical technique was made randomly. Patients were aged between 34 years and 76 years with an average age of 65,2 years. For internal fixation of the humeral fracture was used two perpendicular plates as is customary AO (posterior for external column, internal for the internal column)(1,2), or one plate on one column and other columns with screw fixation or Kirschner wire fragments (humeral fixation was done in such a way as to provide better stability as the fixation assembly)(5). For olecranon osteosynthesis was used only AO tension band(6).

After surgery patients were enrolled in an intensive functional rehabilitation program (3), being re-evaluated at 2 weeks, 4 weeks, 2 months, 3 months, 6 months and 1 year. At each visit patients were investigated radiologically and functional (flexion, extension, pronation, supination, grip strength – gripping). Evaluation of patients was done according to the sheet of the patient with distal humerus fracture, elbow Mayo score and gripping ability. The gripping ability was measured experimentally. Thus, patients in the sitting position, with the forearm flexed at 90 ° and the arm resting on a firm plan, so that the wrist joint plan to be free at the edge of the firm plan and with the palm in full pronation, argued in his hand a tennis ball which have different weights attached to a hook. Gripping function was taken as follows:

- "-" if the patient failed to maintain for 20 seconds weighing 500g
- "+" if the patient was able to maintain for 20 seconds weighing 500g
- "+ +" if the patient was able to maintain for 20 seconds weight 1000g
- "+++" if the patient was able to maintain for 20 seconds

[1]Corresponding Author : B. Ciubara, 7 Rufeni street, Iaşi, România; e-mail: abciubara@yahoo.com; tel +40-0744212518
Article received on 25.08.2010 and accepted for publication on 25. 10. 2010
ACTA MEDICA TRANSILVANICA December 2010; 2(4) 285-287

weight 2000g

Patients had simple postoperative evolution. At 48 hours after surgery was initiated functional rehabilitation. Patients received 2 weeks of immobilization with analgesic effect.

## RESULTS AND DISCUSSIONS

The average length of hospitalization for patients in this study was 5 days including pre-operative hospitalization period. At departure, all patients acuse moderate pain at the active mobilisation of the elbow and pain disappeared in rest of the elbow. Arch of flexion - extension was averaged 40° and the arch of pronation-supination was averaged 50° for both types of approaches. It should be noted that these values were under intraoperative passive mobility, under anesthesia, (close to maximum values; mobility was limited only by Posttraumatic edema). Thus, at the time of departure, joint mobility is severely restricted by the pain arising from the active mobilization and post-traumatic periarticular edema. Mayo ebow score at departure was between 30 and 45 points, made just by its first three sections, the perception of pain, joint mobility and stability, because the functionality could not be assessed objectively at this time of evaluation. All patients were discharged with analgesic split immobilization. The gripping determined at the time of departure had a value of "-" for all operated patients.

Next assessment of patients was performed at 14 days postoperatively. At this visit was suppressed immobilizationt and sutures. We also have completed the sheet data and Mayo elbow score was calculated. On this visit there hasn't been registred progress in the recovery of limb function, while patients benefited on a functional rehabilitation program, immobilization was analgesic purposes only. The values recorded were as follows: flexion – extension arch averaged 40° and arch of pronation-supination averaged 50°. Mayo elbow score was around 60 points increase due to the lower perceptions of pain by patients. In the composition score was not included activities of daily living. Gripping ability was assessed at "+" for 4 patients operated by transolecranian approach and "-" for the other 12 patients, with a "+" for three of the patients operated by Brayan-Morrey approach and "-" for the other 13 patients .

At 4 weeks visit flexion - extension arch values recorded was between 60° and 90° with a mean value of 80° for patients operated by Brayan - Morrey approach and slightly higher values was recorded for those operated by transolecranian approach, respectively values between 70° and 100° with a mean of 90°. For the motion arch of pronation-supination measurements showed a reverse situation, ie between 75° and 95° with an average of 85° for transolecranian approach and and between 85° and 100° with a mean of 90° for Brayan - Morrey approach. Mayo elbow score values were recorded between 55 and 85 points with an average of 75 points for patients operated by transolecranian approach and between 60 and 90 points with an average of 80 points for the group of patients operated by Brayan - Morrey approach. Differentiation between the two groups was done by the activities related to hygiene, nutrition and dressing, more progress were registred to the patients that were operated by Brayan - Morrey approach. This distinction is probably closely related to the movements of pronation and supination because for this type of movement is also recorded a difference in favor of patients were we used Brayan - Morrey approach. Gripping ability was assessed for patients operated by transolecranian approach to "+ +" for two patients, with "+" for 11 patients and "-" for the other three, with "+ +" for six of the patients operated by Brayan - Morrey approach and with "+" for the remaining 10.

At the control of two months, flexion - extension arch values were recorded between 80° and 135° with an average of 105° for patients operated by Brayan - Morrey approach, equaling the values recorded for patients operated by transolecranian approach, for which results were similar . For arch of pronation-supination remains a better value for patients operated by Brayan - Morrey approach, respectively between 90° and 150° with an average of 130°, while for transolecranian approach values recorded were between 85° and 120° with an average of 105°. Mayo score values were recorded between 65 and 95 points with an average of 85 points for patients operated by transolecranian approach and between 70 and 100 points with an average of 90 points for those operated by Brayan - Morrey approach. This maintains a slight gap between the two groups of patients, showing a recovery lag faster when the surgery was performed by Brayan - Morrey approach. The gaps are mainly due to the fact that patients operated by Brayan - Morrey approach seem to recover more quickly in terms of personal hygiene-related activities and those related to eating and wearing. Gripping ability was assessed for patients operated by transolecranian approach to "+ + +" for 3 patients, with "+ +" for 11 patients and "+" for the other two, with "+ + +" for five of the patients operated by Brayan-Morrey approach, with "+ +" for 10 patients and "+" for one patient.

Control of three months regestered new progress in recovering of the operated joint. For the arch of flexion - extension were recorded values between 85° and 145° with an average of 115° for patients operated by transolecranian approach and between 95° and 160° with an average of 135° for patients operated by Brayan - Morrey approach. For arch of pronation-pination remains a better value for patients operated by Brayan-Morrey approach, respectively between 110° and 160° with an average of 140°, while for transolecranian approach values were recorded between 90° and 140° with a mean of 120°. Mayo score for patients operated by transolecranian approach recorded values between 70 and 100 points with an average of 85 points and for patients operated by Brayan - Morrey approaches values were between 85 and 100 points with an average of 95 points. At this visit most patients said that they can freely conduct their own activities related to hygiene and nutrition and dressing activities. Gripping ability was assessed for patients operated by transolecranian approach to "+ + +" for 8 patients, with "+ +" for 7 patients and "+" for a patient, with "+ + +" for 10 patients operated by Brayan-Morrey approach and "+ +" for 6 patients.

In control of six months for some patients it was found that the progress has been modest, in others a slight weakening in the functional capacity of the operated joint, but the changes was not significant in the batches from the previous control.

At last visit, at one year postoperatively, there were no significant differences compared to previous visit.

Next we will draw attention to difficulties or intraoperative incidents about the two surgical approaches analyzed. Brayan-Morrey approach requires extensive experience in handling the fracture fragments, even if peak olecranon excision was performed. Handling ability of the fragments is also limited by the fact that the forearm can be sprained previously. It is possible to encounter difficulties when inverting flap triceps is very well represented. It is necessary a correct positioning of the patient for an optimal access to the humeral fracture - an angle less than 110° limiting consistent the view to the articular surface. Brayan-Morrey approach offers excellent access to the internal column humeral palette, but restricts access to the external column, cause the presence of triceps at this level. Basically through this approach we can not put the plate on the

external side of the distal humerus. Transolecranian approach has the advantage of an approach simple to made and easy even for inexperienced surgeons. Transolecranian approach offers exceptional access to the pillars of the distal humerus and to the distal humeral articular surface, especially when it is sprained forearm above. Sprain of the forearm can lead problems to restoring anteversion of the end of humerus. The Transolecranian approach present the same drawback as Brayan-Morrey approach for patients with large muscular mass and fracture with shaft extension. It is necessary a high attention when we pick up the olecranon, because some fragments joints, without any attachment or support, may fall.

## CONCLUSIONS

Bryan-Morrey approach is still up-to-date and shouldn't have been abandoned. The great advantage is that it avoids the olecranon osteotomy, which involves automatically less material of osteosynthesis.

From a functional point, the patients who were operated by Brayan - Morrey approach perform better and faster than those who were operated by classical transolecranian approach. However it can be seen in the first phase of rehabilitation an small advance of functional recovery of the arch of flexion-extension for transolecranian approach. This advance is due to anatomical changes, that the existing angulation after the olecranon osteosynthesis.

Grip strength function is also better recovered in patients operated by Brayan - Morrey approach and this is translated in Mayo elbow score which is still in favor of this approach.

We also noted that the Mayo elbow score is not always correlated with degrees of freedom of movement measured at the joint. This deterioration has the reason of persistence of the pain in operated joint. Finally we have the advantage of the Brayan - Morrey approach shortening operator.

Another advantage of Brayan - Morrey approach is that it is exempt to the intolerance to the olecranon osteosynthesis material or its migration.

Given the issues described above, for type C fractures of the distal humerus, personally consider to be appropriate to replace the transolecranian approach with Brayan - Morrey approach.

## REFERENCES


1. Abzug M. Joshua, Dantuluri K Phani. Use of Orthogonal or Parallel Plating Techniques to Treat Distal Humerus Fractures Hand Clinics, Volume 26, Issue 3, August 2010, : 411-421
2. Barbu D., Niculescu D. Tratamentul actual al fracturilor supra- şi intercondiliene de humerus Revista de Ortopedie şi Traumatologie, Bucureşti, 1998, vol 8, nr 3+4, : 215-219
3. Brown RF, Morgan RG. Intercondylar T-shaped fractures of the humerus. Results in ten cases treated by early mobilisation. J Bone Joint Surg Br. Aug 1971; 53(3): 425-8
4. Bryan RS, Morrey BF. Extensive posterior exposure of the elbow: a triceps-sparing approach. Clin Orthop 1982, 166 : 188.
5. Caja V.L., Moroni A., Vendemia V., Sábato C., Zinghi G. Surgical treatment of bicondylar fractures of the distal humerus Injury, Volume 25, Issue 7, September 1994, Pages 433-438
6. Jupiter B. Jesse Internal fixation for fractures about the elbow Operative Techniques in Orthopaedics, Volume 4, Issue 1, January 1994, : 31-48
7. Morrey BF. Limited and extensile triceps reflecting exposure of the elbow. In morrey BF, ed: Master techniques in orthopedic surgery : the elbow, NY, Raven Press limited, 1994 : 3-19.