

CHAPTER I

INTRODUCTION



STATEMENT OF THE PROBLEMS

Children tend to protect themselves with their outstretched arms when they fall. The upper extremity consistently accounted for 65% to 75% of all the fracture sustained in children. The incidence of distal humeral fractures ranges from 7% to 9%. In a combined series of 5,228 fractures of the distal humerus, 79.8% of them involved the supradondylar area. The peak incidence occurs in the first decade of life.

In Siriraj hospital, supracondylar humeral fracture is the most common fracture in children (prevalence of about 33% of all fractures in children). Of these fractures, the totally displaced fracture is the most difficult one, because in the treatment process, there are three stages. First, there must be some types of manipulation to obtain a reduction of the fracture. Second once the fracture is reduced, the quality of the reduction must be assessed. If the reduction is adequate, the third stage involves maintaining the reduction until the fracture is healed enough to be intrinsically stable. The major reason for an unsatisfactory outcome usually involves failure to adhere to these three basic stages. Potential problems associated with this injury is the malunion in a position of cubitus varus because of marked swelling and difficulty in reduction and maintaining an adequate reduction especially with cast immobilization. Although the nondisplaced or minimally displaced fracture can be satisfactorily treated with cast immobilization, the totally displaced fracture is unstable and requires

further intervention if optimal results and minimal complications are to be obtained.

Although other techniques have been described, open reduction and closed reduction with pinning is the most common techniques used to treat this kind of fracture.¹⁻²⁷

The major advantage of percutaneous fixation is to achieve stability of the fracture without resorting to extreme position ; it is less expensive than traction. The uniformly good results were reported when adequate reduction were obtained. In contrary, a good result cannot be achieved by any techniques, when a poor reduction is accepted.

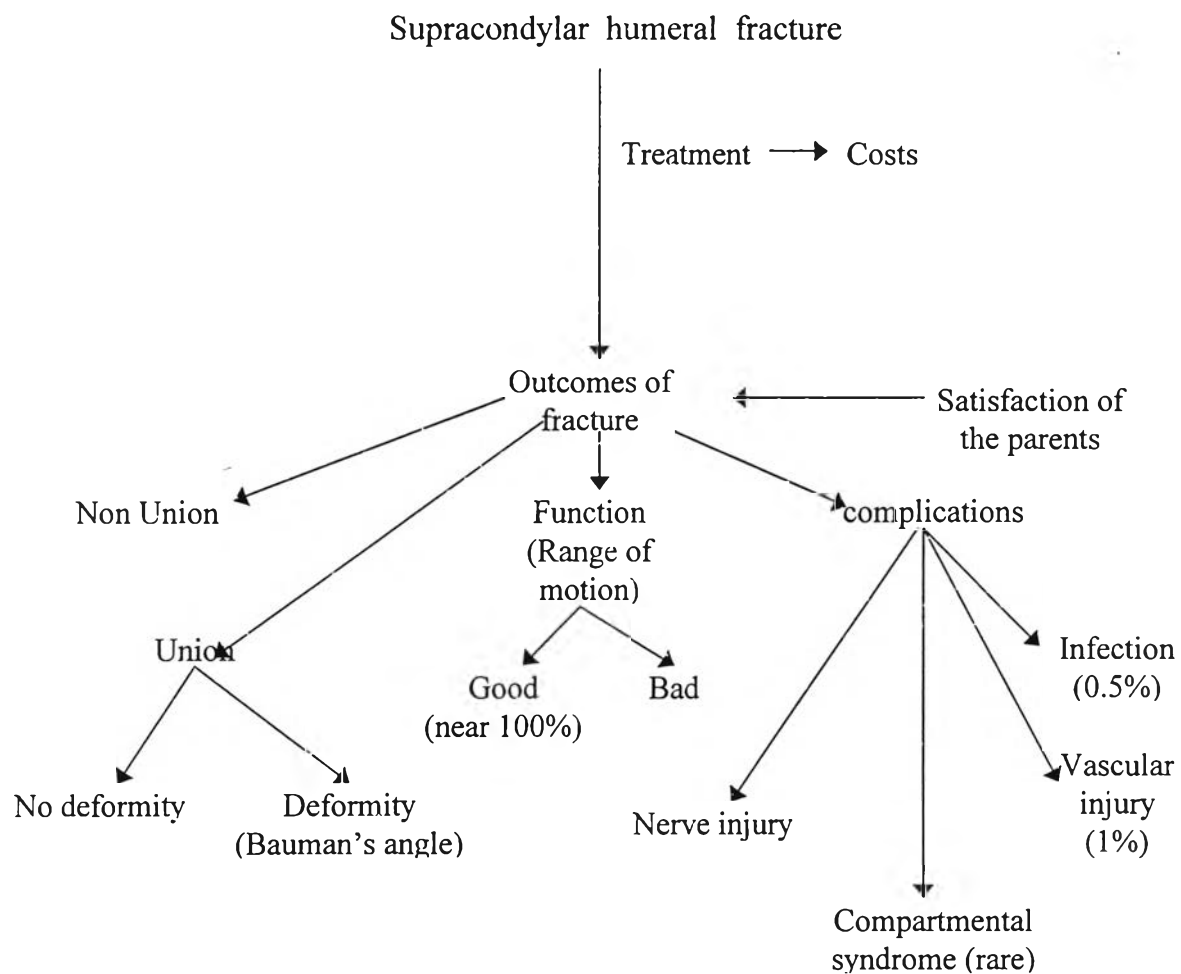
Primary open reduction is not a new concept. It is believed that one of the reasons for poor results in the earlier series was because the open reduction was used as a last resort and after considerable tissue damages from repeated manipulations.

The method of treatment varies according to the surgeon. There is neither a study in randomization nor an economic analysis to compare these two treatments found in the literatures but there were many descriptive studies about the treatments that had biases and confounders which might alter the outcomes.

PURPOSES OF THE STUDY

1. To measure the difference in Baumann's angle on the fracture side from the normal side and compare between closed and open reduction groups.
2. To compare the satisfaction, the complication rates, the cost-effectiveness, the range of motion between two groups of treatment.
3. To consider which method should be the treatment of choice for children with totally displaced supracondylar humeral fractures.

CONCEPTUAL FRAMEWORK



RESEARCH QUESTIONS

Primary research question

In children with closed totally displaced supracondylar humeral fractures, does closed reduction under fluoroscopy and pinning compared with open reduction and pinning result in not more than 5 degree difference in deformity? (the deformity is defined as the difference in the Baumann's angle compared between injured side and normal uninjured side)

Secondary research questions

1. Which method is more cost-effective, in provider's and parents' perspectives?
2. Which method has higher satisfaction score as measured by visual analog scale?
3. What are the complications of both treatments and how often on the complications rates?
4. What are the average range of motion in both groups?

Hypothesis

$$H_0 \quad \mu_A = \mu_B$$

$$H_1 \quad \mu_A \neq \mu_B$$

μ_A = mean difference of the Baumann's angle between injured side and uninjured side in groups A who were treated by closed reduction and pinning = deformity A angle.

μ_B = mean difference of the Baumann's angle between injured side and uninjured side in groups B who were treated by open reduction and pinning = deformity B angle.

Significant level 5%

Power of the test 99%

Hypothesis testing unpaired t test in two different group means

Reject H_0 , if P Value < 0.05

EXPECTED BENEFITS AND APPLICATION

We will know the results of both treatments for closed totally displaced supracondylar humeral fracture in all aspect of outcomes.i.e.,deformities, effectiveness, satisfaction and complications. From the results of the study we can use as guideline for this fracture especially in the viewpoints from surgeon, provider and parents.

Key words

1. Supracondylar humeral fracture

It is the fracture that occur just above the condylar area of the distal humerus.

2. Totally displaced fracture

It means that there is no contact between two fragments of fracture. Both anterior and posterior cortex are broken.