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# CHILDREN'S SUPRACONDYLAR FRACTURES: CONSENSUS AND DIFFERENT PERSPECTIVES

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**Abstract**

There are two treatments that are most recommended for displaced supracondylar fractures of the humerus, which are closed reductions and percutaneous pinning, but some debate persists regarding pinning techniques, immobilization periods, elbow range of motion exercises, and insight regarding elbow range of motion. Children suffering from supracondylar fractures of the humerus were the focus of this study. Various viewpoints about the treatment of such injuries were investigated in order to establish consensus. This study involved a questionnaire that asked about the type of pin being used, the method of arm joint motion, and perceptions about the degree of elbow range of motion being returned. The number of pediatric orthopedic surgeons was 17, the number of hand surgeons was 48, and the number of general orthopedic surgeons was 11. For children with a displaced supracondylar fracture of the humerus, 95 percent of the musculoskeletal physician recommended closed reduction and percutaneous pinning. A significant difference was shown between the three groups of orthopedic surgeons regarding pin appearance technique (lateral versus crossed pinning, $p = 0.017$), but not regarding pin number. All groups preferred 2 pins over 3 pins. A removable splint was usually used by orthopedic surgeons during ROM exercises. Children's orthopedic surgeons are less concerned with elbow stiffness after supracondylar fracture, and are more likely to recommend the use of gentle passive motion as elbow motion after supracondylar fracture. Active ROM exercise is the most commonly adopted arm joint motion method by children musculoskeletal physician. In general orthopedic surgery and pediatric musculoskeletal surgery, the long suffering age was the biggest factor in restoring elbow function, while in hand surgery, the extent of injury was the biggest factor in restoring elbow function. There is a need for more investigation and communication

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between the different subspecialties of orthopedic surgeons regarding the treatment of pediatric supracondylar fractures of the humerus in order to minimize malpractice and avoid the threat of medical malpractice lawsuits.

**Keywords:** Children, Different perspectives, Physician, Elbow Motion, Subspecialty

## INTRODUCTION

The management of humerus clevage of the humerus in toddler is often the responsibility of musculoskeletal physician with subspecialties other than pediatric orthopedic surgery [1,2]. As a result, pediatric supracondylar fractures of the humerus will pose a challenge for orthopedic surgeons to treat. As of yet, a study has not been conducted to examine whether there has been consensus regarding the treatment strategies of treating orthopedic surgeons.

Despite the fact that developing better treatments is sometimes risky and uncertain in medical research, it is of the utmost importance to make improvements to human health. The consensus approach, which is the standard in clinical practice, is secure, treasures and sensible when it comes to deciding the course of action based on the degree of evidence that exists, or even if the evidence is insufficient [3, 4]. To avoid malpractice and medicolegal problems, it is imperative for physicians to be on the same page when dealing with common diseases, especially when they are being cared for by physicians with different subspecialties [5-8].

Despite most musculoskeletal physician agreeing that a closed depletion and trandermal pin is the initial therapy for displaced humerus fractures [9], there has been some controversy or no evidence concerning the pinning methods, the period of treating of fractures, reclamation and medication following the operation [10-13]. To make the right decision in their clinical practice, orthopedic surgeons use a variety of strategies.

With the help of a specifically designed questionnaire, the aim of this study was to investigate the perspective of different surgeons regarding antiseptic fixation methods and the postoperative concord when treating humerus fractures of the humerus in children and adolescents.

## METHODS

There were three pediatric orthopedic surgeons who worked on the study, as well as one hand surgeon, with the purpose of gathering as much information as possible on the treatment of children who sustain displaced supracondylar fractures of the humerus without experiencing neurological complications during their treatment. Two orthopedic surgeons were interviewed directly for the purpose of completing the questionnaire. This questionnaire survey was conducted in 2019 during the annual meeting of the Indian Society for Surgery of the Hand and the Pediatric Orthopedic Association. A list of participants' subspecialties was compiled and divided into three groups namely.

The first is pediatric orthopedic surgeons, the second is hand physicians, and the third is general musculoskeletal physician. Approximately 65% of pediatric orthopedic surgeons devote their clinical practice to infant musculoskeletal operation after completing a pediatric orthopedic companionship. In more than 65% of hand surgery cases, the surgeon has completed a hand surgery fellowship at least once and performed hand surgery in more than one year. There was

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no further subspecialization required for general orthopedic surgeons after they received their orthopedic board certificate.

During the first nine questions, participants were asked to select a pin technique, range of motion (ROM) exercise method, osteolysis while performing the mild movement, work, medication, and discernment of ROM exercise and arm joint bend as a result of the study. We also asked four additional questions regarding the participation of various factors which contributed to the restoration of a patient's range of motion following the release of the supracondylar fracture of the humerus. The participants' responses to these questions were assessed using a visual analogue scale (VAS) (Appendix I).

We used SPSS version 15.0 to conduct the statistical analysis. A percentage is used to express the frequency of all events. A mean and standard deviation are calculated based on the averaged values. Statistical analysis of the choice of treatment strategies was conducted by using the chi-square test. A Kolmogorov-Smirnov test was used to determine the normality of the data, and a Kruskal-Wallis test was used to compare the three groups. Statistical significance was determined by a p-value of less than 0.05.

**RESULTS**

Sixty-six orthopedic surgeons agreed to participate out of 130 invited (response rate 58%). The pediatric orthopedic surgeons accounted for 17, the hand surgeons for 48, and the general orthopedic surgeons accounted for 11.

Children with displacement humerus cleavage of the humerus are most likely to benefit from closed reduction and percutaneous pinning, according to the majority of orthopedic surgeons (96%) last year. Among the three orthopedic surgeons, all of whom were hand surgeons, there were other treatment options available besides closed reduction and percutaneous pinning. As shown in Figure 1, the three groups differed significantly in their choice of which pinning method to use (lateral pinning and crossed pinning). Pediatric orthopedic surgeons and hand surgeons did not differ significantly in the choice of lateral or crossed pinning methods ($p = 0.279$) in comparison with general orthopedic surgeons. All three groups preferred two pins over three pins ($p = 0.0157$), no significant difference between them was found in the number of pins. Among pediatric musculoskeletal physician (41% and 73%, respectively) as well as general musculoskeletal physician (46%), lateral 2 pins were the most commonly used method, while crossed 3 pins were the most commonly used method among hand surgeons.

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Fig. 1

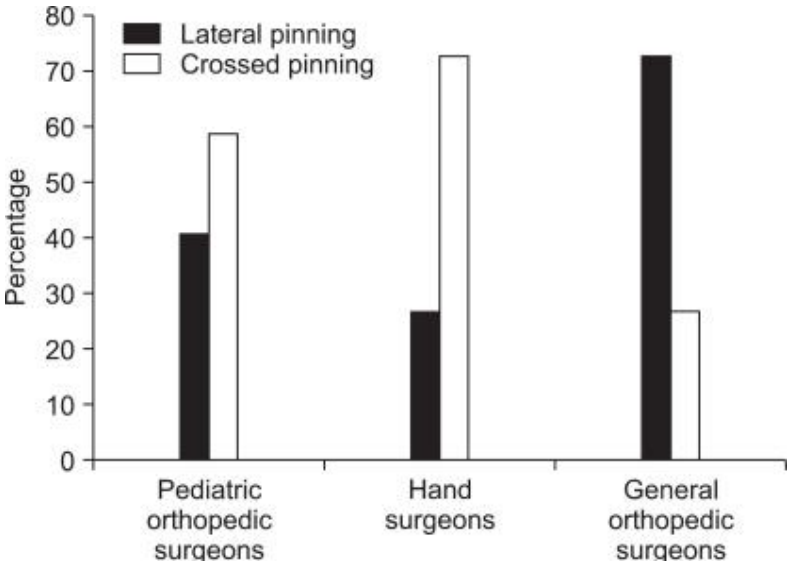


Fig. 1: Children with displaced supracondylar fractures of the humerus should be pinned through their preferred entry point.

Among all three groups of orthopedic surgeons, pins were most often removed after four weeks. 75 percent of pediatric and general orthopedic surgeons instructed the patients to move their elbows within 3 to 4 weeks after surgery, while 33% of hand surgeons instructed patients to move their elbows within 5 weeks ($p = 0.446$). The preference for active ROM exercise was most prevalent in pediatric orthopedic surgeons, while gentle passive ROM exercise was most commonly preferred by hand surgeons and general orthopedic surgeons (Fig. 2). As a result, neither of the three groups showed significant differences with regard to the choice of elbow motion among the three groups ($p = 0.600$). In all three groups, removable splints were preferred for immobilization during the exercise period. However, many surgeons did not prescribe nonsteroidal anti-inflammatory medications or prescribed them based on the patient's pain level. Pediatric orthopedic surgeons were the most likely to say that gentle passive ROM exercise would not be beneficial to children with supracondylar fractures of their humerus, whereas hand surgeons and general orthopedic surgeons were the most likely to say that they had no idea of how elbow ROM exercises would work (Fig. 3). The responses of the two groups did not show any significant differences ($p = 0.605$). In order to instruct their patients to move their arms in all three groups of movements, the majority of orthopedic surgeons recommended that they pronate and supinate, as well as extend and flex their arms. There is a wide range of opinions on elbow stiffness, but pediatric orthopedic surgeons were most likely to agree that it is not a problem if a supracondylar fracture occurs in a child, while general orthopedic surgeons and hand surgeons had a more conservative view of elbow stiffness, which is 'relatively not problematic' (Fig. 4).

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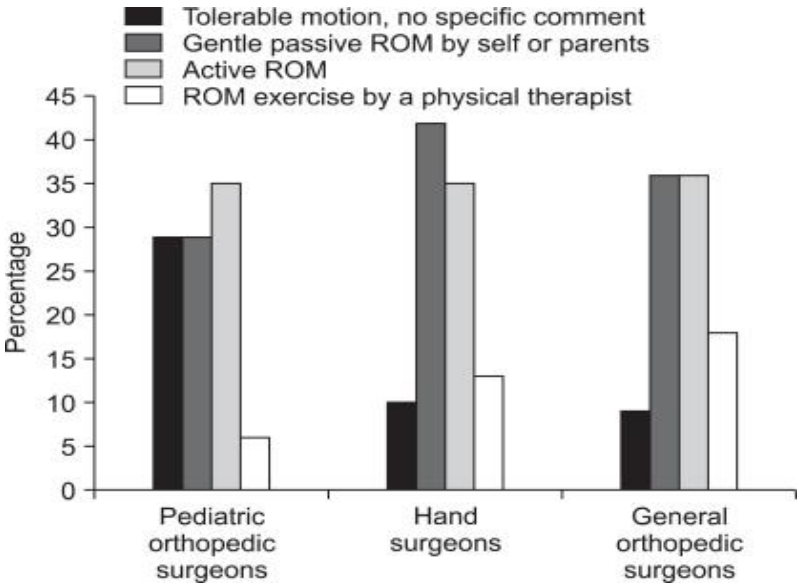


Fig. 2: Infant with supracondylar humerus cleavage should exercise with range of motion exercises.

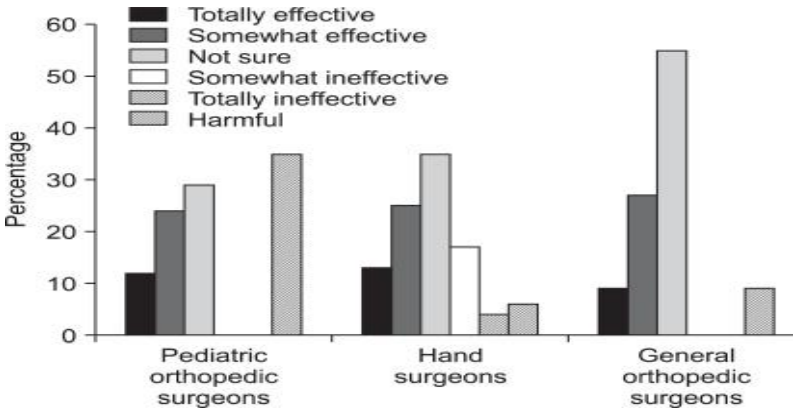


Fig. 3: Exercises after supracondylar cleavge of the humerus in children are perceived to be beneficial by orthopedic surgeons.

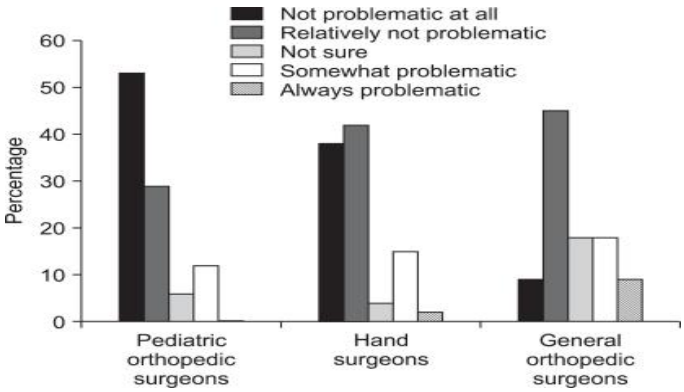


Fig. 4: Children with supracondylar humeral cleavage, orthopedic surgeons' perceptions of elbow stiffness.

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Among children musculoskeletal physician and general musculoskeletal physician perspectives, the patient's age, the meantime in the middle of trauma and final fetish, ROM workout, and the degree of injury were the factors that contributed most to restoring arm joint ROM after a humerous cleavage in children. A patient's age, the meantime in the middle of trauma and final fetish, and the amount of injury contributed most to restoring elbow ROM in the hand surgeon group; ROM exercise was next. VAS scores among the three groups did not differ significantly in any of the four factors. As shown in Figure 5, age, meantime in the middle of trauma and final fetish, amount of injury, and range of motion workout were all analyzed.

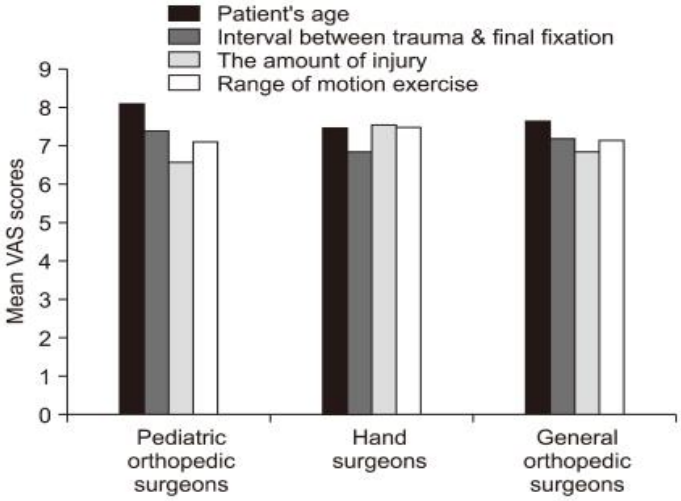


Fig. 5: Children with a supracondylar fracture of the humerus, VAS scores represent the perceived importance of each factor in the restoration of elbow motion.

**DISCUSSION**

Children with displaced supracondylar fractures of the humerus were examined in this study to determine the current consensus on appropriate treatment. Children with displaced supracondylar fractures of the humerus were found to be treated with closed reduction and percutaneous pinning, even though the pinning techniques differed. Non-steroidal anti-inflammatory drugs were not ordinary prescribed by most musculoskeletal physician during the ROM exercise period. When orthopedic surgeons operate on children, they tend to remove the pins earlier than hand surgeons and begin movement of the elbows earlier. General musculoskeletal physician tend to be more concerned with arm joint spasticity than children musculoskeletal physician after supracondylar fractures, and prefer gentle idle rotation to prevent arm joint stiffness. Best common method of elbow motion rehabilitation adopted by pediatric orthopedic surgeons is active range of motion exercise. The amount of injury and the patient's age are considered the best important give up factors to restoring arm joint function in pediatric and general orthopedic surgeons, respectively.

Some limitations are present in this study. I would like to make the following points. First, the perspectives of due to the majority of participants being hand physician, the overall orthopedic

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surgeons were not included in the study would be similar to those of the overall orthopedic surgeons. It is also worth noting that this study was not validated by a validating committee. Interviewing orthopedic surgeons directly could reduce the possibility of bias, however. A third reason is that children musculoskeletal physician and hand physician are the ones who tend to treat the majority of supracondylar fractures of the humerus in children. Due to this difference in clinical conditions, the results of the study may not be comparable with those in other countries.

Children musculoskeletal physician and hand physician preferred lateral entry increase than general musculoskeletal physician. A study of hand surgeons found that they preferred the most stable pin placement method, using three crossed pins, while children musculoskeletal physician and general musculoskeletal physician preferred the safer lateral pin placement method. There is evidence to suggest that crossed pinning is biomechanically more stable than lateral pinning, but that it is also more probable to cause iatrogenic ulnar nervous palsy when compared to sideways pinning. We have found that within our study, none of the participants preferred using 3 lateral pins despite a previous study having reported this method [14, 15]. As a result of the lack of conclusive results and a lack of clarity regarding the pinning technique, further research will be necessary.

After an open reduce and fixation within the body of the arm joint, a study showed that physical therapy (passive and active range of motion exercises) accelerated the recovery of arm joint ROM, but did insignificant its final ROM after one year of surgery. During the course of our study, we found that only 12% of pediatric orthopedic surgeons who knew of humeral supracondylar fractures referred their patients to a physical therapist. It has been found that the most common answer given by pediatric orthopedic surgeons was that the effects of gentle idle range-of-motion workout were detrimental, followed by undetermined, partly effectual, and wholly effectual. Among the ophthalmologists and musculoskeletal physician who responded to the survey, the most frequent response was that the effectiveness of gentle idle ROM exercises is undetermined, then some results show some effectiveness of passive ROM exercises. Based on our finest knowledge, there is not a lot of evidence concerning the efficacy of physical therapy in children who have experienced a supracondylar fracture of the humerus after closed reduction and pinning, despite our knowledge that physical therapy may have a positive effect on their recovery process.

The question of whether or not displaced humerous clevage of the humerus in children are treatable varies confirming to the different subfield of musculoskeletal physician, as the results of this study shed light on the current consensus and different perspectives. There is the possibility of elbow stiffness and other complications following operative treatment of displaced supracondylar humerous cleavage in infants, namely fascination mislaying and iatrogenic nerve palsy, which can lead to medicolegal issues in certain cases, particularly if there is a lack of published evidence to back up the claim. If it were not for a consensus among doctors, then there would be no unnecessary legal issues to worry about in such cases. As a result of this study, we are optimistic that we may be able to provide useful information to that particular audience in that regard. It will require more evidence as well as more effective communication between the

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various subspecialties of orthopedic surgeons in order to reach a more complete picture through a more comprehensive investigation using multiple subspecialties, in order for there to be consensus between them at the same time.

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