Return to Play After Common Pediatric Fractures: Is There Consensus?

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Abstract

Background: There is a surprising small amount of literature supporting decisions about when pediatric patients may safely return to activity after fractures. We designed a survey to assess whether there is consensus regarding time until return to play among physicians who treat pediatric fractures. We hypothesized that there would be a low degree of conformity, and also that non-surgeons may differ from surgeons in their return-to-play regimens.

Materials and Methods: A survey of Pediatric Orthopedic surgeons and Primary Care Sports Medicine physicians was distributed locally, then nationally to the Pediatric Research in Sports Medicine (PRISM) group. For each fracture type, a representative x-ray was shown. Respondents were asked to quantify their preferred duration from time of injury until return to play by choosing among multiple choice options. Responses were tallied anonymously, and then sorted by surgeons versus non-surgeons. The degree of interobserver agreement was determined using two different metrics, Fleiss’ κ and Krippendorff’s α.

Results: The response rate for survey respondents in the Cleveland area was 14/33, and for the PRISM group was 47/195, for an overall response rate of 27%. Evaluation of interobserver agreement using both Fleiss’ κ and Krippendorff’s α showed that there lacks agreement among raters regarding return to play timing, and that this low level of agreement is fairly similar among surgeons, non-surgeons, and all raters together. A disparity plot demonstrates that surgeons chose the most conservative answer more often than non-surgeons (difference of 5.2%), and that non-surgeons chose the most aggressive answer (shortest time period until unrestricted return to play) more often than surgeons (difference of 4%).

Conclusion: There is poor agreement among all respondents, and within the group of surgeons and non-surgeons, regarding optimal return-to-play times.

Clinical Relevance: The lack of consensus demonstrated in this survey provides substantive evidence that randomized controlled studies are needed for each of the common injuries used in our survey in order to standardize care and to promote safer, more evidence-based management.

Keywords: Fracture; Sports; Return To Play; X-Rays; Pediatric; Orthopaedic Surgeons; Sports Medicine

Introduction

There is a surprisingly small amount of literature supporting decisions about when pediatric patients may safely return to activity, especially sports, after the commonest fractures seen by Pediatric Orthopedists [1,2]. The risk of allowing pediatric fracture patients to return to play prematurely includes risk of re-injury; malunion or nonunion, or growth disturbance [3]. Clavicle fractures are among the most commonly seen sports-related injuries in adolescents, especially those who play football, and the risk of re-fracture must be weighed carefully when allowing these patients to return to play [4]. Surgical fixation of mid-shaft fractures may result in superior outcomes and allow for a shorter time until safe return to play [5].

Salter Harris II fractures of the phalanges are also seen frequently by Pediatric Orthopedists and must be carefully evaluated when determining return to play [6]. Although nonunions of scaphoid fractures in the pediatric population are rare, the decision of when patients with these injuries may safely return to play remains controversial [7]. Wrist injuries from falls on outstretched hands often result in buckle or torus fractures in the pediatric population, especially in soccer; and although these fractures usually heal without issue, the question of when these children may return to sports and place themselves at risk for re-injury remains unanswered [7,8]. Stress fractures are especially common among high school athletes who participate in sports like cross country and soccer; but there is no evidence to determine time until return to play for these injuries. Many student athletes are being advised to return to play as early as three weeks after diagnosis of the injury, which may lead to further injury and long-term sequelae [9].

We designed a survey in which representative x-rays of common fracture types were shown, and respondents were asked to choose among four time intervals when they would allow the patient to return to play without restriction. This survey was distributed among Pediatric Orthopedic surgeons and Primary Care Sports Medicine physicians. The purpose of this study is to assess whether there is consensus regarding time until return to play among physicians who treat pediatric fractures. We hypothesized that practices vary wildly, and that there would not be a high degree of conformity. We also hypothesized that non-surgeon Sports Medicine physicians may differ in their return-to-play regimens from Pediatric Orthopedic surgeons.

Methods and Methods

A survey of Pediatric Orthopedic surgeons and non-operative Sports Medicine physicians in the authors’ home area of three large children’s hospitals was initially conducted, followed by expansion of the survey to the Pediatric Research in Sports Medicine (PRISM) group to increase the sample size. The PRISM group comprises surgeons and non-surgeons who specialize in the treatment of pediatric sports injuries. The survey contained 23 cases in which representative x-rays of pediatric sports-related fractures were shown. All were closed fractures in children ages 5 to 17. Cases included clavicle, phalanx, scaphoid, metacarpal, distal radius, midshaft ulna, medial epicondyle elbow, radial neck, and metatarsal fractures. Respondents were asked to quantify their preferred duration from time of injury until return to play for each injury type by choosing among four multiple choice options. The multiple choice options included ranges of time-points from injury for example: “less than 6 weeks; 6–8 weeks; 8–12 weeks; greater than 12 weeks”.

Surveys were sent electronically for ease of use and to encourage prompt response time. Responses were tallied anonymously, and then sorted by surgeons versus non-surgeons. The distributions of responses for each individual question were analyzed, and the probability of two random respondents choosing the same answer (“% agreement”) was determined. Specifically, if every “pair” of
answers from any two of the respondents was aggregated, the "% agreement" is the proportion of pairs of answers that matched. Thus, randomly distributed answers between 4 answer choices would be expected to have % agreement of 25%. The range of % agreement for all 23 fractures was determined, as well as the average, minimum, and maximum values. This method was applied to all respondents, and then % agreement was determined for surgeons and non-surgeons separately. The distribution of responses plotted by the percentage choosing the most common, second most common, third most common, and least common answer choices were evaluated graphically for all respondents, then by surgeons and non-surgeons separately. The degree of interobserver agreement was determined using two different metrics, Fleiss’ κ and Krippendorff’s α [10,11]. Lastly, the difference in responses between surgeons and non-surgeons was evaluated using a disparity plot, in which the difference in percentage of surgeon minus non-surgeon choosing each answer for each question was determined.

Results

The response rate for survey respondents in the local area was 14/33 (42%; 12 surgeons and 2 non-surgeons responded), and for the PRISM group was 47/195 (24%; 36 surgeons and 11 non-surgeons responded), for an overall response rate of 27%. For all respondents, the range of % agreement for all 23 questions was 28.9–66.8% with a median of 38.1%. As each question had 4 answer choices, we would expect a % agreement of 25% if answer responses were completely random. When the data was analyzed by subgroups of surgeons and non-surgeons, similar results were observed. For surgeons, the range of % agreement for all 23 questions was 28.7–70.1% with a median of 40.2%. For non-surgeons, the range of % agreement for all 23 questions was 21.3–49.7% with a median of 35.5%. The distributions of those choosing the most common, second most common, third most common, and least common responses are shown graphically for all respondents, surgeons, and non-surgeons (Figure 1 A–C).

Evaluation of interobserver agreement using both Fleiss’ κ and Krippendorff’s α showed, at a high level, that there lacks agreement among raters regarding return to play timing, and that this low level of agreement is fairly similar among surgeons, non-surgeons, and all raters together. Fleiss’ κ for all respondents was 0.110, and for surgeons and non-surgeons was 0.118 and 0.091, respectively, indicating only “slight agreement”. Krippendorff’s α for all respondents was 0.276, and for surgeons and non-surgeons was 0.273 and 0.296, respectively, also indicating a low-level of agreement, as the conventional cut-off value is defined at α = 0.8 (Table 1) [10,11].

Finally, the difference in responses between surgeons and non-surgeons is illustrated in a disparity plot (Figure 2). This plot shows that surgeons chose the most conservative answer (longest time period until restricted return to play) more often than non-surgeons (difference of 5.2%), and non-surgeons chose the most aggressive answer (shortest time period until unrestricted return to play) more often than surgeons (difference of 4%).
Discussion

There is poor agreement among all respondents, and within the group of surgeons and non-surgeons, regarding optimal return-to-play times for common pediatric fractures. Evaluation of the data by both simple data summary and advanced measurements of interobserver agreement consistently showed lack of agreement among survey respondents. Additionally, surgeons have a tendency to keep fracture patients out of unrestricted play for a longer duration than non-surgeons, which may reflect prior experiences with re-injury, loss of fracture reduction, and other preventable complications.

This study has several limitations. First, a survey has inherent selection bias based on which individuals elected to respond, and a relatively low response rate of 27% may accentuate this bias. Also, the four answer choices for each question were chosen at the discretion of the authors alone. However, the range of answers for each question was broad (for example, from “less than 6 weeks” to “greater than 12 weeks”), and the distribution of responses were centered about the middle two answer choices overall, indicating that the data is unlikely to be artificially skewed due to narrow or unreasonable answer choices.

The main advantage of this survey was the number and variety of common fractures that were included (23 questions about fractures in the upper and lower extremities and clavicle), and the ability to sort responses based on whether the respondent was a surgeon or non-surgeon.

In conclusion, the lack of consensus demonstrated in this survey provides substantive evidence that prospective cohort studies comparing clinical outcomes for different return to play times are needed in order to standardize care and to promote safer, more evidence-based management for common pediatric fractures.

References