Double dislocations in a single digit: a Canadian perspective
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Abstract

Dislocation of both joints in the same digit due to a single insult is rare. To date there have been no reported cases from Canada. The purpose of our study is to review the literature and to survey plastic surgeons about this injury. We have contributed two case reports as well. Within six months, two patients presented to the Halifax Infirmary plastic surgery clinic for management of a double dislocation of a single digit. A comprehensive literature review of the English and non-English literature was performed. Additionally, a survey on experiences with double dislocations was developed and distributed to Plastic Surgeons practicing in Canada. 61 reported cases were identified in the literature, none of which were treated in Canada. 76% of cases were reported in English with the remaining 24% of cases reported in a non-English language (German, French). One hundred of the 373 members of the Canadian Society of Plastic Surgeons contacted replied (27%). Fourteen had previously encountered a double dislocation of a single digit. This injury was treated with closed reduction 90% of the time and splinting (65%) for two to three weeks. All patients regained normal range of motion with the exception of one. Ninety-three and 85% favored closed reduction and splinting, respectively. Two weeks was the preferred immobilization period (36%). We present the first reported cases of double dislocation of a single digit in Canada. We outline the etiology of this rare injury, previous treatments employed, and potential pitfalls encountered. The authors recommend a preferred treatment strategy for the management of double dislocation of a single digit.

Quantifying the epidemiology of finger joint dislocations is not a trivial task. Likely underreported, an article by Brinker et al. quantified it based on orthopaedic referrals. Over a period of time, represented as 1000 member life-years, they found a rate of 0.059 for hand dislocations. A finger dislocation can be caused by hyperextension, hyperflexion, lateral deviation, torsion, or impaction. When medical care is sought for a finger dislocation, reduction and a period of immobilization is often the extent of necessary treatment. Much less common however, is an injury in which both joints in a finger are essentially simultaneously dislocated (Figure 1). Therefore, the epidemiology is harder still to elucidate and treatments are not easily correlated with results. Bartels et al. reported the first incidence of such an injury in 1874 and a limited number of case reports and reviews have followed since. There have been no cases of double dislocations in a single digit reported from Canada to date.

Two cases of double dislocations presented to the Halifax Infirmary within a short period of time. Each case was treated similarly, although a paucity of available literature was available for guidance. The purpose, therefore, of this article was to review the literature and to survey plastic surgeons practicing in Canada on their experiences with double dislocations. Additionally, we report on the two cases of patients with this rare injury.

Methods

A literature review of the English and non-English language literature was conducted. Non-English language articles were translated to English for

Figure 1. Example X-rays of double dislocations in a single digit.
The following was extracted from each selected article and used for this review: author, year, sample size of each group, study model, follow-up duration, study results, and author’s recommendations. The results of the studies were qualitatively assessed. For the purpose of this study, primary outcome measures were range of motion and complication rates. A normal range of motion was defined as 110 degrees of flexion at the proximal interphalangeal (PIP) joint and 90 degrees at the distal interphalangeal (DIP) joint, as per Mathes.5

Survey
A survey was developed and distributed to plastic surgeons practicing in Canada registered with the Canadian Society of Plastic Surgeons (CSPS). The purpose was to establish how common the injury is in Canada, how it has been treated in the past, and how members of the CSPS would treat it if encountered in the future. The survey was facilitated by Opinio software, which is a third-party survey-administering service that was accessed through our local institution, Dalhousie University. Using Opinio, each CSPS member was contacted to complete the survey. The email subject used was “Have you seen this injury?” with the intent of creating curiosity and increasing the completion rate. After two weeks the survey was resent. The survey was available for a total duration of 3 weeks. Any completed surveys were returned to Opinio, which anonymized the information and provided results.

Results

Literature Review
A total of 67 reported cases were identified in 41 retrieved articles, none of which were Canadian. Thirty-two (78%) of the articles were reported in English6-37 and the remaining nine (22%) were reported in a non-English language (5 French, 4 German).38-46

The little finger was the most affected finger, with 37 (55%) total cases. The ring finger, long finger, and index finger had 13 (19%), 4 (6%), and 4 (6%) reported cases, respectively. The remaining cases did not report the affected digit. Of the 67 reported cases, 46 patients (68%) had their hand splinted following reduction of the dislocations. Buddy taping was used to treat 10 (15%) cases, and the rest of the patients were either casted or the authors did not specify.

In 42 cases (63%) the patient ultimately regained full painless range of motion with the affected finger. However, 18 patients (27%) were left with range of motion (ROM) deficits and three patients (4%) had to undergo procedures because of complication (joint instability and severe pain).6,19,35 All of these reports that included comments on patient function indicated that patients were fully functional despite their ROM deficits. In the remaining cases the authors did not specifically comment on follow up or outcomes.

Case #1
In October 2008, a 17-year-old right hand dominant male presented to the local Plastic Surgery clinic. He had sustained a double dorsal dislocation of the distal and proximal interphalangeal joints in his left little
finger. In addition, he also had a small volar plate avulsion fragment at the base of the middle phalanx. The injury occurred while playing basketball.

The diagnosis was made by X-ray. He had had his injury reduced at a peripheral hospital, and during the clinic visit the finger was buddy-taped to the ring finger for a recommended two-week period. At the one month follow-up appointment, the patient reported that he was only adherent to two days of buddy taping. On physical exam residual swelling remained over the PIP joint, and it was slightly bruised and tender in the area as well. Flexion was limited, but he was able to achieve nearly full extension. The patient was referred to physiotherapy to continue improving his functional outcome. He was then lost to follow up.

Case #2

In November of the same year a 16-year-old right hand dominant male was seen for a dorsal dislocation of both the DIP and PIP joints in his right little finger. In this case there was no associated avulsion fragment or fracture. The injury was sustained while playing volleyball. The diagnosis was made by X-ray. His finger was also reduced at a peripheral hospital, and at the clinic visit his finger was buddy-taped to the ring finger for a recommended two weeks. This patient also was only adherent with a short period of buddy taping (one day), and at a day nine follow-up appointment the buddy taping was redone. At greater than two months follow up, the patient had full flexion, but there was 30 degrees of flexion contracture at the PIP joint. He reported that tenderness had been decreasing over time, and he was further instructed on exercises to reduce the contracture. He was then lost to follow up.

Discussion

Double dislocation of a single digit has an exceedingly low incidence, which is primarily a reflection of its etiology. For a double dislocation to occur, the distal phalanx is struck by a force that causes the DIP joint to dislocate dorsally. The force is of such a magnitude that it is not fully dissipated in the DIP joint and is therefore transmitted to the PIP joint with sufficient remaining energy to cause an additional dorsal dislocation. For this to occur, the force must strike the palmar distal phalanx within a limited range of potential angles, which fall between parallel and perpendicular with the digit, but cannot approach either. There is general agreement on this mechanism in the literature.13

Treatment of this injury did not differ substantially between the literature and surveyed members of the CSPS. Patients were usually managed with a splint, and common positions for splinting were the intrinsic plus and position of safety. The second most popular treatment option was buddy taping to an adjacent digit. Two weeks was the most common length of immobilization, and early mobilization was frequently encouraged.

In the literature, 4% of patients ultimately had to be managed surgically because conservative management failed. These patients suffered complications, which were related to pain and recurrent dislocations. One patient had been splinted, and one had been buddy taped. It is difficult to make conclusions from these two isolated cases, but important to recognize that complications are a possibility following this injury.6,19

Of the 14 cases recorded in the survey, only one (7%) had an unsatisfactory outcome. This is in contrast to the literature review, which showed 27% of patients had residual deficits in ROM. This difference is likely explained by the much lower sample in the survey results, but could also be due to a recall bias, which is intrinsic to the retrospective survey. Surgeons were asked to remember if they had seen the injury, and how they treated it. In at least one case the injury had occurred 27 years previously, so there may have been
difficulties recounting case details. Many surgeons commented following the survey that the hypothetical case was restricted in options. This limitation tended to constrain responses, but it was necessary to make the options discrete to allow for quantitative results.

The review was limited by the quality of studies. Very few studies included were higher than level 4 case reports, and none were higher than level 3 research. Therefore, making definitive conclusions is precluded based on the level of quality of articles available for review. The survey was limited by recall bias, and the potential for a single case being reported by different care providers. However, amalgamating the information from each component of this study, the authors recommend treating double dislocations of a single digit with a closed reduction, followed by splinting or buddy taping to an adjacent digit for a period of two weeks. The finger should be in the position of safety or with slight flexion in both the DIP and PIP joints. An injury more complex than two simple dislocations however warrants consideration of alternative management strategies. Many survey comments pointed out that an unstable reduction is important to recognize. Follow up is necessary, and residual ROM deficits are the most common complication. Early mobilization should be encouraged to help alleviate the incidence of complication, however they commonly did not affect patient function.

References