THREE CASES OF WRIST PAIN AND ULNAR HYPOPLASIA

ABSTRACT

Introduction: The goal of this report is to provide evidence of the importance of radiological information in cases of wrist pain in the presence of bone malformation.

Case Presentations: This report provides a description of three patients who presented to one chiropractic facility with a chief complaint of wrist pain. The similarity of presentation was that each complaint was initiated by physical exertion with the wrist, without history of trauma. No observable deformity of the wrist or other findings from the physical examinations provided conclusive evidence for the diagnosis. Radiographic examination and radiometric analysis on the antero-posterior and lateral views determined the axial relationships of the wrist joints as compared to normal values. The analysis in each case yielded a radiological impression of suspected (CFU) Congenital Foreshortening of the Ulna with resultant decreased wrist angles.

Discussion: Cases of ulnar ray deficiency are categorized with regard to clinical manifestation with a sub classification into four types. Type I is hypoplasia or defect of the ulna. Three cases of CFU presenting to one facility within a one year period suggests the possibility of a high incidence of CFU in patients with wrist complaints. The pre-disposition to injury and degenerative changes may have significant, negative socio-economic consequences on those persons with CFU. This would be more likely for those in occupations involving repetitive wrist motion or high forces to the wrists.
Conclusion Radiological impression of congenital foreshortening of the ulna with resultant decreased wrist angles was suspected to be a contributing factor to the cause of wrist pain in these three cases.

KEY WORDS: WRIST PAIN, ULNAR HYPOPLASIA, RADIOLOGIC, CASE REPORT

INTRODUCTION

The wrist is considered to be the most complicated joint in the body. Forces are transmitted from the hand through the carpals to the radius while a high degree of sophisticated movement is demanded. (1) The specific aim of this report is to highlight the importance of radiological information in cases of wrist pain in the presence of bone malformation. The assumption of normal anatomy and the reliance on physical examination finding in this type of a condition may not result in a clear clinical picture. Choice of effective treatment protocols and reasonably accurate prognosis may be difficult to determine in the absence of the radiographic evidence of bone malformation.

A literature search in PubMed utilizing the key words wrist pain, ulna and malformation provided a considerable amount of information regarding ulnar malformation. The majority of the studies discussed upper limb malformation syndromes in pediatric cases. Cases of ulnar ray deficiency are categorized with regard to clinical manifestation. Based on clinical evidence, a sub classification into four types was established. Type I, hypoplasia or partial defect of the ulna; type II, total defect of the ulna; type III, total or partial defect of the ulna with humeroradial synostosis; and type IV, ulnar defect with congenital amputation at the wrist. (2).
CASE PRESENTATIONS

Three patients presented to one chiropractic facility with a chief complaint of wrist pain which started after physical exertion with the hand and wrist, but with no history of trauma to the wrist. Observation revealed no deformity of the hand or wrist. The findings from a physical examination proved inconclusive. Radiographic examination was then performed comprised of postero-anterior, lateral, medial oblique and ulnar deviation projections. A radiometric analysis was performed on the antero-posterior view (angle #1) and the lateral view (angle #2). Measurements were taken to determine the axial relationships of the wrist joints and then compared to normal values.

Case One: a male, 38 years of age. Angle (#1) measured 65.5 degrees. This represents a deviation from normal of 6.5 degrees. Angle (#2) measured 76 degrees. This represents a deviation from normal of 3 degrees.

Case Two: a female, 37 years of age. Angle (#1) measured 67.2 degrees. This represents a deviation from normal of 5.8 degrees. Angle (#2) measured 80.6 degrees. This is within the normal range by .6 degrees.

Case Three: a female, 24 years of age. Angle (#1) measured 66.6 degrees. This represents a deviation from normal of 6.4 degrees. Angle (#2) measured 70.5. This represents a deviation from normal of 9.5 degrees.

The analysis in each case yielded a radiological impression of suspected (CFU) Congenital Foreshortening of the Ulna with resultant decreased wrist angles. No other abnormal radiographic findings were revealed in any of the cases.
DISCUSSION

The radius is the only forearm long bone to have a true articulation with the carpals and absorbs approximately 80% of the axial load. As a result a large percentage of wrist injuries and syndromes involve the radiocarpal joint. The ulna is separated from the carpals by the triangular fibrocartilage (articular disc), which is a component of the triangular fibrocartilage complex (TFC). Although the ulna does not have a true articulation with the carpals, it does absorb approximately 20% of the axial load and is extremely important for stability of the radiocarpal joint. The TFC does not usually remain an intact structure past the fourth decade of life. Macro-trauma or repetitive micro-trauma can result in perforations and avulsions. Ulnar length variance is associated with a predisposition to TFC injury. Anatomical variants, in particular variability in the length of the ulna, may lead to painful conditions. These longitudinal ulnar deficiencies are rare.

In a study by Freedman, Edwards, Willems and Meals, measurements of the normal axial relationship of the major joints of the skeletal system yielded a set of normative values using a sample of 25 males (age range 18-75) and 25 females (age range 19-25). The values for the wrist represent the relationship of the ulna and radius. The values are determined by a line analysis performed on plain film radiographs of the postero-anterior and lateral projections. On the postero-anterior view (Figure 3A) two lines are drawn and the intersecting angle (#1) is the determinate factor. One line (AB) is constructed tangentially from the tip of the radial styloid process through the base of the ulnar styloid process. A second line (CD) is constructed along the mid shaft of the radius. On the lateral view (Figure 3B) one line (EF) is constructed
tangentially across the most distal points of the articular surface of the radius. A second line (GH) is constructed through the mid shaft of the radius. The intersecting angle (#2) is the determinate factor.

This study yielded normative values as follows: Angle (#1) in the antero-posterior projection in males ranged from 72 degrees to 93 degrees with an average value of 82 degrees; in the females from 73 degrees to 95 degrees with an average value of 84 degrees; and the average value for the entire group was 83 degrees. Angle (#2) in the lateral projection in males ranged from 79 degrees to 93 degrees with an average value of 84 degrees; in the females, from 80 degrees to 94 degrees with an average value of 87 degrees; the average value for the entire group was 85.5.(6) Other researchers found that variance in ulnar measurements and patient age, race or handedness do not correlate to a significant degree.(7)

CFU will be a pre-disposition to degenerative changes in the wrist and to wrist injury due to the altered bio-mechanics of the joint. This pre-disposition will be magnified for those persons whose occupation induces high forces into the wrist.

CONCLUSIONS

The radiographic information was essential in determining the presence of structural malformation in these cases. The physical examination findings were those common to many other wrist conditions and so were inconclusive. When assuming the presence of normal wrist anatomy in cases of CFU, adjusting techniques of the extremity may not be as effective as expected in managing cases of wrist pain.
The fact that three cases of CFU presented to one facility within a one year period of time suggests the possibility that there is a high incidence of CFU in patients with wrist complaints. The pre-disposition to injury and degenerative changes may have significant, negative socio-economic consequences on those persons with CFU, particularly those in occupations involving high forces to their wrists. This would be the case for those within the chiropractic profession whose primary activities include adjusting techniques which induce high forces through their wrists.

Further research is needed regarding CFU. It may be useful to determine the incidence of CFU in the population of persons with wrist complaints. It may be useful to document long term progress of patients with wrist pain and CFU to determine if symptoms are chronic and the degree to which degenerative changes occur. It may be useful to screen those entering the chiropractic profession for CFU to determine their suitability for long term use of high force adjusting techniques.

REFERENCES


WRIST PAIN RADIOLOGICAL DIAGNOSIS – blinded
Word count 1634 with title and abstract in count


FIGURE 1A    FIGURE 1B
Antero-posterior view    Lateral view

LEGEND: FIGURE 1A and 1B are hand drawings which demonstrate radiographic wrist anatomy and line drawing analysis as seen in “Normal Axial Relationships of the Major Joints”
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LEGEND: FIGURE 2 IS THE ANTERO-POSTERIOR RADIOGRAPH FROM CASE 1 WITH RADIOMETRIC ANALYSIS