

## Type III Monteggia Equivalent Fracture with Ipsilateral Distal Radial Epiphyseal and Ulnar Metaphyseal Fracture in a Child -Case Report-

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**This paper present a rare case of a Type III Monteggia equivalent fracture with an ipsilateral distal radial epiphyseal (Salter-Harris type II) and an ulnar metaphyseal fracture in a child. An 8-year-old boy sustained a closed bipolar fracture of his forearm after a fall from a height. The closed reduction was unsuccessful. Therefore, an open reduction and plate fixation was performed for a diaphyseal fracture of the ulna, and the unstable radial fractures and the distal ulnar metaphyseal fracture were treated with a closed reduction and internal fixation using Kirschner wires (K-wires). Two years after surgery, the joint motion including the forearm, wrist and elbow were completely normal. Radiologically, the bone was well united without any residual deformity.**

**Key Words:** *Monteggia equivalent fracture, Forearm, Bipolar fracture, Plate fixation*

A Monteggia equivalent fracture is an uncommon childhood injury comprising approximately 2% of all childhood elbow fractures. In very rare situations, it has been reported to be associated with ipsilateral limb injuries<sup>1-10</sup>. The author experienced an uncommon injury of the upper limb, namely, a Monteggia Type III equivalent fracture with a fracture of the ipsilateral distal radial epiphyseal (Salter-Harris type II) and an ulnar metaphyseal fracture in a child. No previous reports has shown an injury identical to the one currently described. This paper describes the clinical and radiographic findings and discusses the various treatment methods.

### CASE REPORT

An eight-year-old boy was examined after fall from a height and was immediately referred to us for treatment. He had remarkable deformities and swelling of his forearm and wrist. There was no external wound, and the sensory and finger

motions were not disturbed. The radiographs showed a metaphyseal fracture of the proximal radius with a lateral displacement as well as a diaphyseal fracture of the ulna. There was also a Salter-Harris Type II fracture separation of the distal radial epiphysis with a dorsal displacement as well as a metaphyseal fracture of the distal ulna with an ulnar angulation. A dislocation was not noted in the proximal and distal radioulnar joint (Fig. 1). Even though the closed reduction had been attempted under general anesthesia, the reduction was not acceptable due to the floating of the radial shaft and instability of the ulna. First, the diaphyseal fracture of the ulna was stabilized with an open reduction and internal fixation with plate and screws. Second, a closed reduction and percutaneous pinning with K-wires were performed for the distal radial epiphyseal and ulnar metaphyseal fracture. Plate fixation for a diaphyseal fracture of the ulna provided sufficient stability to attempt a closed reduction of the fracture separation of the distal radial epiphysis and the distal ulnar metaphysis. Finally, a closed reduction of the proximal radial metaphyseal fracture was attempted using a percutaneous pinning technique and was fixed with two K-wires. The open reduction was not required for the fractures of the proximal and distal radius. A long arm cast was applied with the elbow in 90° flexion and neutral rotation. The postoperative

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Fig. 1. Initial radiographs show displaced fractures of the distal radial epiphysis and a fracture of the distal ulnar metaphysis with a type III Monteggia equivalent fracture.



Fig. 2. Open reduction and plate fixation was performed for a diaphyseal fracture of the ulna and the radial fractures and the metaphyseal fracture of the ulna were treated with a closed reduction and internal fixation using K-wires.

radiographs showed an acceptable alignment (Fig. 2). The plaster cast was removed after four weeks and the patient began active exercise. The K-wires were removed at the 7-weeks follow up. The full range of motions and bony union were achieved at the 4-month follow up. The plate was removed at two years after surgery (Fig. 3).

## DISCUSSION

A Monteggia equivalent fracture is uncommon in children. In addition, ipsilateral proximal and distal forearm injuries are quite rare. Such combinations previously reported include a Type II Monteggia lesion and a fracture separation of the lower radial epiphysis<sup>4</sup>, a Type IV Monteggia injury with a distal diaphyseal fracture of the radius<sup>9</sup>, and a Monteggia Type I lesion combined with a fracture separation of the distal radial epiphysis<sup>2,6</sup>. A simultaneous prox-



Fig. 3. Two years after surgery, radiographically, bone was well united without any residual deformity.

imal as well as a distal "bipolar" fracture of both bones of the forearm has also been described<sup>5</sup>. Bipolar fractures similar to our case include a Monteggia Type III equivalent injury and a distal radial and ulnar fracture<sup>1</sup>, and a Monteggia Type II equivalent injury involving a fracture separation of the proximal radial epiphysis (Salter-Harris type II) combined with fracture separations of the distal radius (Salter-Harris type II) and ulna<sup>7</sup>. Our patient differed from the previously described cases in terms of the level of the fracture in the ulna, the direction of the displacement, and the treatment methods. The fracture in our patient can be designated as a Monteggia Type III equivalent fracture involving a fracture of the proximal radial metaphysis with a lateral displacement and fracture of the diaphysis of the ulna combined with a fracture of the distal radial epiphysis (Salter-Harris type II) and a fracture of the distal ulnar metaphysis. The mechanism of an injury of the ipsilateral two level forearm fractures is not very well understood. In our case, a fall on the outstretched hand, a dorsiflexed wrist and a pronated forearm leads to a fracture of the distal radius and ulna. This is because as the force travels upwards, a varus force also comes into play. The Monteggia fracture dislocation in children usually does not require surgery<sup>3,10,11</sup>. However, a Monteggia equivalent with a fracture separation of the proximal radial epiphysis or of the distal ends is known to require an open reduction and internal fixation<sup>4,6,7,9</sup>. It has been previously reported that the treatment of a Monteggia Type III equivalent fracture with a distal radial fracture using closed reduction achieved good results<sup>1</sup>. In a previously reported case, the level of the ulnar fracture was proximal and the degree of the displacement was minimal. In our patient, the

closed reduction under general anesthesia was not successful due to instability. In general, an isolated distal and proximal radial fracture can be managed with a closed reduction with or without internal fixation. Initially, firm stabilization of the ulna is essential for a closed reduction of the fractures of the radial side. Osada, et al.<sup>7)</sup> reported that K-wires reinforced with a circumferential wire might unsuitable for restoring the stability of this unstable fracture, and suggested a secure fixation of the ulna with a plate. In this case, plate fixation of the ulnar diaphyseal fracture provided a sufficient stability during the closed reduction as well as the percutaneous pinning of the unstable radial fractures and the distal ulnar metaphyseal fracture.

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## 소아에서 동측 원위 요골 골단 및 척골 골간단부 골절이 동반된 제 3형 Monteggia 유사 골절의 치료 - 증례 보고 -

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소아에서 드문, 동측 원위 요골 골단(Salter-Harris II형) 및 척골 골간단부 골절이 동반된 제 3형 Monteggia 유사 골절의 치료 증례를 보고하고자 한다. 8세 남아로 낙상에 의한 전완부의 폐쇄성 양극성 골절로 내원을 하였다. 척골 골간단부 골절은 도수적 정복이 불가능하여 관혈적 정복술 및 금속판 내고정술을 시행하였고, 요골의 근위부, 원위부 골절 및 척골의 원위 골간단부 골절은 도수적 정복술 및 K-강선 내고정을 시행하였다. 수술 후 2년에 주관절, 전완부 및 수근 관절 운동범위는 정상이었으며 골절은 변형 없이 잘 유합되었다.

색인 단어: Monteggia 유사 골절, 전완부, 양극성 골절, 금속판 내고정술