Radial head fracture: a potentially complex injury
Kaas, L.

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CONCLUSIONS

Based on the results of the studies presented in chapter 3 to 10 of this thesis, several conclusions can be drawn:

Chapter 3: First of all, we conclude that radial head fractures are common, with an estimated incidence of 2.8 per 10,000 inhabitants per year. Male-female ratio was 2:3, with females being significantly older compared to males, suggesting a possible link to osteoporosis. They are accompanied by associated osseous injuries in 12.4% of the cases. The treating physician should be aware of these injuries when treating patients with radial head fractures.

Chapter 4: Radial head fractures in female patients ≥50 years are identified as potential osteoporotic fractures. These patients had an increased risk of osteoporosis, with an odds ratio of 3.4. This could explain the typical age distribution of patients with a radial head fracture. Identifying radial head fractures in these patients as potential osteoporotic fractures and offering a BMD measurement improves the early diagnosis of osteoporosis.

Chapter 5 and 6: Associated injuries are found in 35 of 46 elbows (76%) with a radial head fracture with MRI of the elbow. (Partial) rupture of the LCL and injuries to the capitellum were most frequently diagnosed. The clinical relevance of the injuries found with MRI in elbows with radial head fractures is investigated and we conclude that only 4% of these injuries are symptomatic or of clinical importance after one year.

Chapter 7: UCL insufficiency of the elbow has been mainly reported in athlete’s and in patients with posttraumatic conditions of the elbow (e.g. posterolateral elbow dislocation) and can be diagnosed with MRI arthrography. Treatment of UCL of the elbow injuries is based on the patients (athletic) demands and the degree of UCL injury and primarily consists of a non-operative treatment. Only symptomatic UCL insufficiency is an indication for reconstruction. The optimal surgical technique is still subject of discussion.

Chapter 8: Few studies on inter- and intra-observer reliability of the Mason classification or its modifications are available and only one on the Mason-Hotchkiss classification. The inter-observer agreement was substantial and the intra-observer agreement ranged from fair to substantial with 4 different observers with different levels of experience. More clinical experience did not significantly improve agreement.

Chapter 9: Few studies with a low level of evidence address the treatment of isolated, displaced, partial articular radial head fractures are available. In these studies, non-operative treatment was successful in an average of 80% of the patients. ORIF was successful in an average 93% of the patients. These data must be interpreted in light of the fact that many of the case series of ORIF were written to introduce or promote operative techniques.

Chapter 10: The short-term functional results of the cemented and press-fit Judet bipolar radial head prosthesis are good or excellent in 88% patients with post-traumatic disorders of the radial head. However, osteolysis of the proximal radius was found in 69%
of the patients with a press-fit design, without any relation to the clinical outcome. The exact cause and whether this osteolysis is progressive remains unknown.

**RECOMMENDATIONS FOR FUTURE RESEARCH**

Although the knowledge on radial head fractures and its associated injuries has significantly increased over the past decade, many aspects of radial head fractures remain subject of discussion. In this thesis, we linked radial head fractures in women ≥50 years of age to osteoporosis, to explain the typical age and sex distribution of patients with a radial head fracture. In chapter 4 we support this theory in a retrospective case-control study using a peripheral bone densometry. Although we found an increased risk of osteoporosis in females with a radial head fracture, prospective case-control studies with sufficient patient numbers are indicated to improve the level of evidence. The bone densometry should be performed using a standard DEXA-scan, still regarded as the golden standard.

As we already concluded in chapter 9, there is a strong need for randomized clinical trials on the acute treatment of Mason type II (non-operative vs. ORIF). The patient population and baseline characteristics, such as radial head fracture type, associated osseous injuries, dominance and age should be well described. A follow-up period of at least 12 months is desirable. Data like range of motion (especially pro- and supination), re-surgery, pain and complications should also be assessed. Clinician based and patient reported outcome measures, such as the Broberg and Morrey score, Mayo Elbow Performance Index and DASH-score, will make the results of treatment more comparable. On the other hand, none of these scores are validated for elbows with a radial head fracture.

Although most short-term results of radial head implants in patients with unreconstructable radial head fractures are good, long term results are scarce. In chapter 10 we discussed results of cemented and press-fit bipolar radial head prosthesis with a minimal follow-up of two years and observed osteolysis of the proximal radius in 69% of the elbows with a press-fit implant. The exact cause and clinical implication of this osteolysis are unknown. Long-term follow-up of patients with a radial head prosthesis, but also biomechanical research on factors such as stress shielding of this implant are necessary.