Chapter 9: Summary
Chapter 2: “Aetiology and incidence of maxillofacial trauma in Amsterdam: A retrospective analysis of 579 patients.”

All patients treated in the VU University Medical Center (Amsterdam), for maxillofacial trauma, were identified retrospectively (period 2000-2010). A total of 579 patients were identified (408 men and 171 women), with a mean age of 35.9 ± 16.3 years. Mandibular and zygomatic bone fractures were the most common among both men and women, accounting for approximately 80% of all fractures. As reported in previous studies, majority of the patients belonged to the age group of 20–29 years among both sexes. The most common cause of fractures was traffic accidents (bicycle accidents being the most frequent), followed by interpersonal violence, particularly among men. The results of this study are mostly in line with other international studies that were conducted in developed countries, but differ on one noteworthy aspect: a higher incidence of bicycle-related accidents.

Chapter 3: “Treatment and complications of mandibular fractures: A 9-year analysis.”

During the period 2000-2009, a total of 225 patients were treated for a uni- or multifocal mandibular fracture. The mean age of this population was slightly lower (32.6 ± 14.6 years) compared with the mean age of all maxillofacial trauma patients. A total of 431 fracture lines were identified. Similar to maxillofacial trauma in general, traffic-accidents were the main cause of mandibular fracture (42%), followed by interpersonal violence (24%) and falls (19%). A total of 1965 screws and 442 plates were used.

Of the total population of 225 patients, 171 condylar fractures in 127 patients were observed. Of these 225 patients, 213 were dentate and 12 were edentulous. Eighty-two (36%) dentate patients presented with a unilateral condyle fracture with or without concomitant fracture of the mandible. These patients were all treated with IMF and osteosynthesis in case of an associated mandible fracture. Forty (18%) dentate patients were treated with IMF for a bilateral condyle fracture, with or without concomitant mandibular fracture. Two (2/225: 1%) patients were treated extraorally using a preauricular approach. Three edentulous patients were diagnosed with either a unilateral (n = 1) or bilateral (n = 2) condyle fracture.
Of all patients treated for mandibular trauma, 27% presented with complications. These included (transient) hyposensitivity of the lip and chin, malocclusion, infected osteosynthesis material and temporomandibular dysfunction. Four (4/225: 1.8%) patients needed surgical correction of a post-treatment malocclusion.

Chapter 4: “Long-term results and complications after bilateral mandibular condyle fractures.”

The long-term outcome of closed treatment of bilateral fractured condyles (with or without an associated mandible fracture) was investigated. Seventy-one patients were identified from the hospital database, all surgically treated between 1995 and 2011. Of these 71 patients, 41 attended the outpatient clinic for review and a thorough physical examination using the Research Diagnostic Criteria for Temporomandibular Disorders (RDC/TMD). Five of them presented with an anterior open bite (AOB), but all were without functional problems and without pain (RDC/TMD grade 0). Of the 30 patients that were not available for clinical evaluation, it was found in the hospital and outpatient records that three patients needed orthognathic correction and one patient orthodontic correction for a post-treatment malocclusion. A rather high malocclusion rate (9/71: 13%) was observed after closed treatment of bilateral condylar fracture. Furthermore, in this investigation, regression analyses showed a significant negative relation between the presence of pain and duration of follow up ($p = 0.02$), and between decreasing intensity of pain with increasing age ($p = 0.03$). This may suggest that if sensations of pain exist, these can diminish or even disappear over time, which could be of great importance when counselling new patients. Furthermore, these results may be of value when discussing what the best treatment is regarding (uni- or bilateral) condylar fractures. Finally, one might debate the need to treat all malocclusions that develop following treatment, as not all malocclusions lead to functional problems or pain. These long-term findings and the rather high success rate of IMF, support closed treatment of uni- or bilateral condyle fractures with arch bars.
Chapter 5: “Closed treatment of mandibular condyle fractures: comparing intermaxillary fixation with screws or arch bar. A randomised clinical trial.”

The results of this prospective multi-centre randomised clinical trial are mostly in favour of IMFS in treating mandibular condyle fractures, in comparison with the use of arch bars. These results comprise perioperative as well as post-operative elements. The surgical treatment time with the use of IMFS led to a significantly shorter application time (on average 52 minutes shorter, p < 0.001) and consequently to a shorter duration of surgery (on average 67 minutes shorter, p < 0.001). From the surgeons’ point of view, the use of IMFS is significantly safer. In this trial 8 (30.7%) needlestick injuries were observed; all accidents occurred during the application of arch bars (p = 0.003).

Not many complications with the use of IMFS occurred: one (0.53%) root was affected by the insertion of an IMFS. One out of 188 screws failed (breakage) during insertion (0.53%). Six (3.2%) screws loosened spontaneously during the follow up period of six weeks, three of which needed to be replaced to apply further functional therapy. Compared to existing literature the incidence of the encountered complications are relatively low. All pain-scores were lower in the IMFS group compared with the arch bars group, including the average pain over the week and pain when removing IMFS.

With regard to occlusion, the use of IMFS leads to the same favourable occlusal results as arch bars. Three patients developed a suboptimal occlusion: one patient was treated with IMFS, and two patients were treated with arch bars. Oral mucosal damages were observed in 22 patients, 11 in each group. In the arch bars group, gingival hyperplasia of the interdental papillae was observed. In the IMFS group, partial mucosal overgrowth of screws was encountered. In overview, taking these results into account and considering the advantages and the disadvantages of IMFS, it is concluded that IMFS are a superior method for applying IMF. IMFS lead to less pain, the same occlusion results, shorter operation times, better opportunities for treatment under local anaesthesia and fewer needlestick injuries. In short, IMFS are safer for patients and surgeons.
Chapter 6: “IMF screws or arch bars for closed treatment of mandibular condyle fractures: the quality of life-aspects.”

The results of this QOL investigation are mostly in favour of IMFS. Patients treated with IMFS experience less social isolation and fewer problems with eating. IMFS-patients express the feeling that they were able to continue a normal diet. Also, it seems that the use of IMFS has a lower negative impact on social and financial aspects of the patient. This conclusion was based on the fact that 36% of persons accompanying arch bars-patients to a regular post-operative check-up cancelled their job commitments for this visit. No differences were observed in the ability to speak between each group.

In today’s literature no QOL-data is available for any type of IMF application. Therefore these results are unique, and may act as a baseline measurement in future research.

Chapter 7: “Post-operative radiographs after maxillofacial trauma: sense or nonsense?”

The purposes of the present study were to investigate the necessity of post-operative radiographic analysis in patients with maxillofacial trauma and compare these results with existing literature. A retrospective analysis was performed concerning all maxillofacial trauma surgically treated in the last ten years in our institute. In total 579 patients were treated for 646 fractures whereas in 16 patients (2.8%) a secondary treatment was needed as the initial treatment did not result in a satisfactory reduction and fixation. The decision to retreatment was mainly based on clinical findings (15 patients, 94%), confirmed by radiographical analyses. For one patient (6%) the decision for retreatment was based on radiographical findings alone. This patient was treated immediately after the initial reduction as radiographic analysis demonstrated a suboptimally elevated zygomatic arch. These results led to the conclusion that routine post-operative radiography is not necessary after surgical treatment of maxillofacial trauma.

Our results are in line with the available literature. However compared to these available studies our results show a relatively high number of retreatments that can probably be explained by the prolonged follow up compared to the other studies. Another explanation may be the inclusion of complex craniofacial trauma.
Intra-operative inspection of the reduction and the immediate post-operative clinical symptoms are better indicators to evaluate the adequacy of the treatment. Post-operative imaging should be reserved for patients with signs and symptoms suggestive of unsatisfactory surgical outcome or complications. Furthermore taking post-operative radiographs may be considered in multiple facial injuries and for educational purposes in a teaching hospital. Nevertheless avoiding performing routine post-operative radiographs will lead to a reduction in exposure of patients to ionising radiation. Further benefits of avoiding routine post-operative radiographs include cost savings and probably more efficient discharge.