Complications among patients treated conservatively for unilateral condylar mandible fractures. A retrospective 6-year followup study.

Rajib Sarder
Robin Radamson

Supervisors
Annika Rosén
Robert Heymann
Summary

Aim
The aim of this study was to retrospectively analyse postoperative complications of conservatively treated unilateral condylar mandibular fractures.

Methods
Between January 2006 and December 2011, a total of 24 patients (male: 18, female: 6; aged between 8 to 86 years) were admitted for conservative treatment (17 patients treated with prescribed soft diet; 7 patients treated with intermaxillary fixation) due to unilateral condylar mandibular fractures at the department of Oral and Maxillofacial Surgery, Karolinska Institute in Huddinge. The fractures were classified as intracapsular (6 patients) and extracapsular (18 patients). A letter of approval distributed together with a questionnaire regarding postoperative discomfort informed all patients. 12 questionnaires were received back at the department of Oral and Maxillofacial surgery. Additional survey was carried out among 3 patients by the telephone. Among the patients who expressed post-operative subjective discomfort in the questionnaire, 5 patients were clinically re-examined pursuant to an examination protocol.

Results
The most common post treatment discomfort reported were clicking or crepitation of the TMJ as in 11 cases of 15, followed by patients not being able to resemble the occlusion as prior to injury as in 9 cases of 15. Six of the patients had subjective discomfort after treatment as they had a total of 17 discomfort symptoms such as clicking/crepitation in 35%, occlusion resemblance in 35%, difficulty opening in 12%, bite off big in 6%, bite of small in 6% but no pain while movement was seen. Clinical re-examination showed that the patients were in general satisfied with the outcome of treatment despite of discomfort.
Conclusions
The results of the present study showed that the most common dysfunctions due to conservative treatment are clicking and crepitation in the temporomandibular joint.
Authors’ **contributions**

Rajib Sarder, establish project plan, review of journals, selection of target group, compose revised questionnaire, distribution of questionnaire, compose revised clinical examination protocol, clinical examination of patients, co-author scientific report.

Robin Radamson, establish project plan, review of journals, selection of target group, compose revised questionnaire, distribution of questionnaire, compose revised clinical examination protocol, clinical examination of patients, co-author scientific report.
Introduction

The temporomandibular joint (TMJ) is considered to be the most complex joint in the human body. It consists of the temporal bone and the condylar process (condyle) of the mandible. The condyle articulates with the temporal bone in the mandibular fossa. These two bones are separated by an articular disc, which functions as articular surfaces and divides the TMJ into two distinct compartments. The lower joint compartment formed by the mandible and the articular disc is involved in rotational movement, this is the initial movement of the jaw when the mouth opens. The upper joint compartment formed by the articular disk and the temporal bone is involved in translational movement, this is the secondary gliding motion of the jaw as it is opened widely. Normal full jaw opening is 40-50 millimeters as measured from edge of lower front teeth to edge of upper front teeth. During jaw movements, only the mandible moves. The mandible is moved primarily by the four muscles of mastication: the masseter, medial pterygoid, lateral pterygoid and the temporalis. These four muscles work in different groups to move the mandible in different directions. Sensory innervation of the temporomandibular joint is derived from the auriculotemporal and masseteric branches of the trigeminal nerve. Free nerve endings are the pain receptors for protection of the temporomandibular joint itself.

The mandible is the strongest and widest facial bone but still it is the most fractured bone, with a mean occurrence of 36 – 70 % (1). Of all mandibular fractures, condylar fractures are common and accounts for 22 – 35 % (2-6, 7). Approximately 20% of the condylar mandibular fractures are bilateral while 80% are unilateral (8). The classification depends on the fracture level, dislocation and condylar head relation to the articular fossa. The fracture level is described as condylar head, condylar neck and subcondylar region (9) (see figure 1, 2, 3).

The main cause for condylar fractures is traffic accidents and falls. In children the most common etiology specific are bicycle accidents. In adults the fracture causes are more commonly sports or assaults (9). A majority of
the condylar fractures are reported as caused by an indirect trauma which is the result of external force directed to another location in the mandible but the condyle (5).

After a condylar fracture in children restitution of condylar process takes place (10-12) which is not expected in adults (13). Children between 3-11 years of age, establish restitution of normal condylar head relation to the articular fossa regardless of the dislocation of the condylar fragments. Children complete normal relation between the long axis of the ramus and the condylar process. In this age condylar heads tends to move posterior on the fractured side. Teenagers between 12-19 years of age do not possess the same extent capacity for restitution of normal condylar head fossa relation and adults have nearly none remodelling process and lack posterior movement of the condylar head on the fractured side (14).

The remodelling process of the temporomandibular joint (TMJ) in children will result in a normal relation of the condylar head to the articular fossa. The late result of unilateral subcondylar fractures is a positional change of the chin towards the nonfractured side. In cases of the condylar head and neck fractures the asymmetric change position is mostly towards the fractured side (15).

Asymmetry of mandibular movements at maximal opening, and differences between the nonfractured and fractured side in maximal protrusion and laterotrusion usually aggravate or persist in adults. While in children between 3-11 years of age, it usually disappears within 2 years. Symptoms from TMJ and muscles such as muscular tenderness, pain or clicking of the disc in the joint, and reduced maximal opening, were frequent in adults and rare in children (16). In an average population, the most common symptom of dysfunction is crepitation and clicking of the disc in the joint (17, 18). The same symptoms can be found in patients treated conservatively after condylar fractures (19).

The masticatory muscle function after condylar fractures has a minor difference from that in an average population. The difference of the remodelling process in children and adults are of minor importance for the
muscle activity (20). Moderate signs and symptoms may be expected after condylar head dislocation, and mild symptoms of dysfunction may be expected after moderate displacement of the condylar head. This might indicate that open reduction in adults could be useful in preventing dysfunctional problems. For condylar head dislocation in children and teenagers, there seems to be no indication for open reduction (19).

In dislocated subcondylar fractures the choice between open reduction and conservative treatment with intermaxillary fixation (IMF) the significantly results from a functional point of view is minor (21). There are suggestions were surgery is indicated; if condylar segment exceeds more than 45 degrees, there is an impossibility of obtaining adequate occlusion by conservative treatment, lateral extracapsular condylar displacement, impairment by condylar fragment of mandibular mobility, bilateral fractures and displacement of the condyle to the middle cranial fossa (21, 22). The indication for surgery is clear when the fracture is dislocated in the middle cranial fossa, when the fracture is combined with a midface fracture or when there is neurologic symptoms (22).

Compared outcomes from open reduction and conservative treatment of condylar process fractures show minor differences in dysfunction of the TMJ, occlusion, pain, and nerve disorders. Subject’s discomforts are the only significant difference. Patients treated with open reduction have shown significant pain in maximum mouth opening and more climates sensitive compared to conservative treated (23). Also outcomes compared from open reduction and conservative treatment of unilateral subcondylar and condylar neck fractures show minor differences in protrusion, laterotrusion, malocclusion, maximal opening and pain in TMJ. However, for the anatomic reduction of the condyle there is a statistically significant difference (24).

Management of condylar fractures is still a current debate among oral surgeons around the world as both conservative treatment and open reduction are currently used. Each management has advantages and disadvantages depending on the level of the fracture and the degree of displacement. It is clear that disadvantages of open reduction are limited
access to the fracture, unsightly scarring, condylar resorption and the risk of damage to the facial nerve (8). However, the advantage of open reduction is a better alternative in severe fractures as already mentioned.

The final choice of treatment depends on individual evaluation of several factors related to both the type of fracture but also to what the patient’s preferences. The age, medical status of the patient, the anatomical level of fracture, degree and direction of displacement of the fractured segments, associated injuries fractures in the maxilla or mandible, the status of the dentition and the surgeons’ experience are some of the factors that influence the outcome (25).

At the department of Oral and Maxillofacial Surgery, Karolinska Institute, Huddinge Sweden, where this study was conducted, nearly all condylar fractures are being treated in the non-surgically fashion with or without intermaxillary fixation.

The aim of the present study was to investigate what kind of complications that occur in the later stage after unilateral condylar fractures treated conservatively. In a long perspective, the obtained result could be of great value in preoperative clinical situations if cases more suitable for surgical reduction can be elucidated.

The current study is part of a larger on-going study which evaluates postoperative complications of condylar fractures treated conservatively between 1995 and 2011 which consists of a total of 147 patients at the department of Oral and Maxillofacial Surgery, Karolinska Institute in Huddinge.
Materials and Methods

Between 1st of January 2006 and 31st of December 2011, a total of 199 patients were admitted for treatment due to trauma at the department of Oral and Maxillofacial Surgery, Karolinska Institute in Huddinge. Three different computerized medical journal systems were used to administrate the patients. Effica Dental Care was the system used for registration in the reception, billing etc. until August 2011 when it was replaced with Opus Dental and Take Care is the system used by surgeons as well as other medical staff of the hospital to enroll diagnosis, progress report and all other medical information. It is not possible for technical and legal reasons to search the database of Take Care by a specific diagnosis code and find a precise group of patients. It was therefore somewhat of a challenging task to identify the target group for this study, which was performed in two steps. In the first step the database of Effica was sought for patients that had trauma and were admitted to the department during a 6 year period between 2006 and 2011. This generated the above mentioned list of 199 patients that were victimized to different kinds of trauma such as bicycle accidents, physical abuse, sports activities, falling accidents, etc. At the second step the medical journals of these patients were reviewed in Take Care by using the social security number. Inclusion of patients suitable for this study was completed by gathering diagnosis and treatment plan. During this period a total of 24 patients aged between 8 to 86 years (18 male, 6 female) treated conservatively of unilateral condylar fractures.

All patients in the study were informed by a letter of approval together with a questionnaire regarding postoperative discomfort (see below). Those patients that for any reason failed to fill out and return the questionnaire were contacted by telephone and requested to participate in the study by replying the survey over the telephone. The patients were asked to state their name and social security number to validate their identity.

Criteria

Criteria for inclusion of the study were unilateral condylar fractures of the
mandible conservatively treated without any concurrent fracture that disturbs the occlusion. The exclusion criteria were one or several concurrent fractures of the mandible, fractures treated with open reduction, patients with severe mental disorder. Fractures that occurred within less than six months prior to survey was also excluded as elapse of this time of period has shown to have a significant role for recovery of mandibular movement and jaw function [26].

**Fractures**

The fractures were classified according to the localisation, intracapsular or extracapsular which is in agreement with international guidelines [27] (see Fig. 1, 2, 3).

**Fig. 1,** a schematic figure of classification of fractures

**Fig. 2,** a CBCT x-ray of an intracapsular condylar fracture
Collected data from journals
The following data were documented: Age, age at the time of trauma, gender, cause of trauma, date of trauma, classification of fracture, type of treatment (soft diet/intermaxillary fixation), and personal information.

Questionnaire
A questionnaire regarding the post treatment mandibular function, subjective discomfort and pain was distributed together with a letter of consent to each of the included patients [see table 1].
The questionnaire contained the following questions:

1. Cause of trauma
2. On the whole, do you consider yourself being completely recovered from the trauma?
3. Are you able to chew/bite off bigger portions of food, for instance meat?
4. Are you able to chew/bite off smaller portions of food, for instance salad?
5. Does your occlusion resemble the one you had prior to trauma?
6. Do you have pain from your jaws/masticatory system while chewing or talking/speaking?
7. Do you have pain from the jaws/masticatory system in rest, for instance during sleeping hours?
8. Do you have difficulties opening your mouth?
9. Do your jaws click, crepitate or lock while opening your mouth?

Table 1, the questionnaire distributed among 24 patients contained questions as above.

Re-examination

The patients were offered a free follow-up at the department of oral and maxillofacial surgery. Among the patients that considered themselves to be fully recovered, the concern for a clinical follow-up were none or very little. An oral and maxillofacial surgeon examined 5 patients that expressed complaints in the questionnaire and approved to a follow-up examination. For each patient, the following data was collected: personal information, medical history, cause of trauma, and location/type of fracture. The post treatment discomfort was assessed both subjectively and objectively. An examination protocol was established (see appendix 1).
Statistics

All data collected from questionnaire and examination protocol were compiled and statistically analyzed and presented as mean and per cent using of a Microsoft Excel sheets. All tables and diagrams presented in this report are as well produced with the use of Microsoft Excel sheets.
Results

During the 6 year period between 2006 and 2011 a total of 24 patients were treated conservatively for unilateral condylar mandibular fractures at the department of Oral and Maxillofacial Surgery, Karolinska Institute in Huddinge. The age of the patients ranged between 8 to 86 years at the time of treatment with a mean age of 41 years. There were two different approaches to treatment, 17 patients, 18 men and 6 women, were treated simply being prescribed on a soft diet while 7 patients were treated with intermaxillary fixation (IMF). IMF contains of either lose elastic draws as in 5 cases and rigid fixation in 2 cases. Majority of the fractures were caused by trauma due to physical assault as in 10 cases, followed by bicycle accidents in 8 cases, and falling accidents in 6 cases (see fig 4). According to the classification of fractures defined for this study, 6 fractures were intracapsular and 18 fractures were extracapsular.

![Distribution of etiology and relative gender](image)

**Fig. 4.** Illustrating the distribution of ethiological factors and relative gender in 24 conservatively treated condylar fractures. The x-axis describe the type of violence and the y-axis the number of patients.
**Subjective discomfort**

Of 24 distributed questionnaires 12 were received to the department of Oral and Maxillofacial Surgery. Additional survey was carried out among 3 patients by telephone.

In 15 surveyed patients the result of post treatment complications and subjective discomfort were as below (see fig 5).

![Subjective discomfort chart](image)

Fig. 5, the x-axis illustrate common post treatment discomfort among 15 patients conservatively treated for condylar fracture and the y-axis the number of patients.

The most common post treatment discomfort reported were clicking or crepitation of the TMJ as in 11 cases, followed by patients not being able to resemble the occlusion as prior to injury as in 9 cases. In 9 cases they considered themselves to be fully recovered. All of the patients reported being able to masticate in an ordinary manner while 2 patients reported difficulty biting of bigger food substances and 1 patient reported difficulty biting of smaller food substances. Subjective pain was reported in 1 case during jaw movement and in 1 case during resting hours. In 3 patients wide opening of the mouth was an issue of discomfort. A total lack of post
treatment complications were reported in 4 cases. Among the 6 patients that did not admit to be fully recovered the most common discomfort was clicking and/or crepitating in the joint and lack of resemblance of the occlusion as all 6 of these patients suffered from both of the mentioned discomfort. A total of 17 discomforts was reported, see figure 6. Two patients reported additional complication in form of difficulty opening and 1 patient among these also reported having difficulty biting of bigger portions, which made this particular case the one with most subjective discomfort.

![Discomfort in "not fully recovered" patients](image)

Fig. 6, illustrating the percentage of discomfort in total 17 reported complications distributed among 6 patients.

Clicking and/or crepitations of the TMJ were a common discomfort even among patients considered to be fully recovered as it was reported in 5 of 9
patients in this group. A total of 12 complications were reported among 9 patients, see figure 7.

![Discomfort in "fully recovered" patients](image)

**Discomfort in "fully recovered" patients**

- Bite off big: 8%
- Bite off small: 0%
- Clicking / Crepitations: 42%
- Occlusion resemblance: 25%
- Difficulty opening: 17%
- Pain while at rest: 0%
- Pain while movement: 8%

**Fig. 7**, illustrating the percentage of discomfort in total 12 reported complications distributed among 9 patients.

**Clinical re-examination**

In 5 cases the patients expressed complaints in the questionnaire and approved to a follow-up examination and were re-examined clinically (see table 2). In 1 patient the post treatment discomfort was severe while chewing a piece of meat and chewing baguette. The mean maximal opening capacity was 52.8 mm, ranging between 38 mm and 60 mm. The mean lateral excursion on the right was 8.8 mm, ranging between 5 mm and 13 mm and on the left was 8.4 mm, ranging between 6 mm and 11 mm. The mean protrusion was 4.8 mm, ranging between 1 mm and 9 mm. In the same
patient that assessed the subjective post treatment discomfort, the estimation of pain according to a visual analogue scale (VAS 0-10) showed at rest VAS 3, at movement VAS 2, at maximal opening VAS 4, and at laterotrusion on the right VAS 3. All other data showed maximum VAS 1 when estimation of pain was done. The same patient also had pain due to the palpation (graded 1-3) of the lateral pterygoid muscle on the right, graded 2. All other data due to the palpation were maximum graded 1. The same patient had also other findings: deviation of the jaw when closing it and a clicking of the disc in the right joint. None of the patients had an open bite. In 2 patients there was deviation of the jaw when opening or closing. In 4 patients there was clicking of the disc. Any facial asymmetry was not reported by the patients but in 2 patients the midline was dislocated.

<table>
<thead>
<tr>
<th>Publications</th>
<th>4</th>
<th>8</th>
<th>23</th>
<th>24</th>
<th>25</th>
<th>26</th>
<th>Current study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of study</td>
<td>retrospective</td>
<td>prospective</td>
<td>prospective</td>
<td>retrospective</td>
<td>prospective</td>
<td>retrospective</td>
<td></td>
</tr>
<tr>
<td>n (total surgical &amp; non surgical treated)</td>
<td>84</td>
<td>150</td>
<td>368</td>
<td>male</td>
<td>65</td>
<td>288</td>
<td></td>
</tr>
<tr>
<td>female</td>
<td>19</td>
<td>80</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>n₂ (total non surgical treated)</td>
<td>74</td>
<td>60</td>
<td>113</td>
<td>32</td>
<td>208</td>
<td>18</td>
<td>24</td>
</tr>
<tr>
<td>male</td>
<td>90</td>
<td>27</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>female</td>
<td>23</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Etiologi (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Traffic accidents</td>
<td>63,1</td>
<td>55</td>
<td>75</td>
<td>56</td>
<td>33</td>
<td>33</td>
<td></td>
</tr>
<tr>
<td>Violence</td>
<td>9,5</td>
<td>7</td>
<td>18,7</td>
<td>13,6</td>
<td>11</td>
<td>42</td>
<td></td>
</tr>
<tr>
<td>Falling accidents</td>
<td>1,2</td>
<td>21</td>
<td>2</td>
<td>15</td>
<td>56</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>26,2</td>
<td>17</td>
<td>4,3</td>
<td>15,4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Treatment (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IMF</td>
<td>87</td>
<td>70</td>
<td>80</td>
<td>67</td>
<td>29</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soft diet</td>
<td>13</td>
<td>30</td>
<td>20</td>
<td>31</td>
<td>71</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Re-examination</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>n₃ (total)</td>
<td>28</td>
<td>113</td>
<td>18</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean max mouth opening (mm)</td>
<td>45</td>
<td>47</td>
<td>43,7</td>
<td>52,8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean protrusion (mm)</td>
<td>4,8</td>
<td>6,2</td>
<td>5,2</td>
<td>4,8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Laterosion non frac side (mm)</td>
<td>8,7</td>
<td>7,3</td>
<td>8,3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Muscle pain (%)</td>
<td>11</td>
<td>3,3</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Result (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subjective discomfort</td>
<td>20,3</td>
<td>73</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Successful treatment</td>
<td>46</td>
<td>27 - 56</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Return to pre injury occlusion</td>
<td>82</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 2, comparison of different variables between the current study and previous studies no. 4, 8 and 23-26 referenced to in the current study.
All of the examined patients were offered further treatment and an initial consultation with an oral and maxillofacial surgeon but all declined. These patients were in general satisfied with the outcome of treatment despite the discomfort.
Discussion

The present study has analyzed the **postoperative complications** of conservatively treated unilateral condylar mandible fractures as well as other factors regarding these type of fractures such as etiology, distribution in gender and form of treatment compared to previous studies (see table 2). We have however not been able to come across any previous study which analyses postoperative complications regarding discomforts in this manner.

Various studies have previously shown a diversified representation of etiological factors where men are more commonly effected than women (table 1). This study indicates that men continue to be over representative in the statistics regarding distribution in gender of this type of fractures however unlike previous studies violence is reported as the most common etiology rather than traffic accidents. Whether this is due to more frequent occurrence of violence in society today or safer traffic conditions is unclear. It is notable that none among the 10 patients in this study reported being victimized of physical assault were women. This might indicate that women are less likely to seek treatment in cases of violence or do not report physical abuse when establishing contact with care instance.

Treatment

The percentage of the patients with fractures that are treated conservatively varies in different studies (table 1). It is further presented by this study that IMF was carried out in a reduced extent at the department of Oral and Maxillofacial Surgery, Karolinska Institute in Huddinge compared to other studies. This might indicate that at the mentioned care instance most patients are treated with minimal invasive dentistry when good occlusion can be established at the fracture side without IMF needed.
Subjective discomforts

As mentioned earlier any previous studies concerning postoperative subjective discomforts are yet to be found. However does the current study show that there is overall relatively little difference in the spectra of subjective discomforts among patients considered to be fully recovered compared to patients not considering to be fully recovered. Clicking/crepitation of the TMJ followed by difficulty with occlusion resemblance are the most common dysfunctions reported among both groups of patients (see figure 6, 7). In the “fully recovered” group clicking/crepitation has a larger representation as it is a dysfunction reported among 42% compared to 35% in the “not fully recovered” group. This might be related to other dysfunctions such as difficulty opening mouth, opening to maximum level, difficulty biting of portions or pain while movement which all are reported in slightly larger extent in the “fully recovered” group (see figure 6, 7).

Although clicking and/or crepitation of the jaw are reported as a post treatment complication in majority of the cases it is not verified at what percentage this was a condition present in the patients prior to treatment. Studies suggest prevalence between 13% - 35% depending on the age in a healthy normal population [28, 29]. In relation to this disorder it is also a matter of further investigation in what extent para functions such as bruxism exist and/or existed prior to treatment in this group of patients. None of the 5 examined patients were however able to reminisce regarding these conditions prior to injury.

Neither is it possible to enunciate about the pretreatment conditions of the occlusion in the patients. Malocclusion prior to treatment can therefore not be excluded as an aggravating factor in onset of TMD such as pain, functional difficulty etc. which in this study were evaluated as subjects of discomfort.

The matter of occlusion resemblance is an utterly subjective sensation and cannot really be compared in an objective way. Only one previous study (8) exists and presents a larger success rate concerning this discomfort compared to the current study (see table 2).
It is noticeable that none of the patients that expressed subjective discomfort in the questionnaire and were re-examined as well as offered further treatment agreed to it as they were all in general satisfied with the outcome of the treatment. This indicates the importance of dissociation between the terms full recovery, success rate and satisfaction when evaluating the outcome of treatment.

**Limitations**

The present study is a longitudinal retrospective study of patients that have been conservatively treated after collum mandibular fractures. The study describes the patient’s situation postoperatively. The outcome cannot be compared with a material of surgically treated patients. For that reason it is necessary to set up a prospective randomized study. The present study considered a very specific type of fracture in addition to several exclusion criterias why the number of patients in this study is rather small. The response rate from the questionnaire that was sent to all 24 patients was 50%, as only 12 were received to the department. This was most likely due to the fact that numerous among the affected patients were difficult to reach by letter or telephone as they were socially disadvantaged individuals such as drug addicts, alcoholics, prisoner or did not have a permanent address. Looking afterwards at the study design the questionnaire should have contained one additional question: Did you have any discomforts of the TMJ before the trauma? This way conclusion could have been drawn about whether if the TMJ discomforts were due to the fracture or not. It is however questionable how precisely a patient is able to recall the occlusion prior to injury, several years back in time.

The results of the present study may be enhanced by the larger on-going study which evaluates the postoperative complications of condylar fractures treated conservatively between 1995 and 2011 consisting of a total of 147 patients at the department of Oral and Maxillofacial Surgery, Karolinska Institute in Huddinge.

To this date there has not been made any prospective randomized study in
this subject but a few retrospective studies have been performed. We intend to initiate a prospective randomized study in the future.

**Conclusions**
This study shows that clicking and crepitation of the TMJ is the most common reported post-operative discomfort among conservatively treated patients. However in what extent this dysfunction existed among the patients prior to injury or is a result of other functional factors than the treatment itself cannot be confirmed by this study.
Acknowledgements

We wish to thank our supervisors Annika Rosén, Robert Heymann and Anna Jinghede for the support, dedication and inspiration.

Many thanks to the staff of the dept. of Oral and Maxillofacial Surgery, Karolinska Institute, Huddinge, for being so helpful.

Last but not least we are very grateful to all the patients that voluntarily participated in this study.
References


2. Rowe N. L, Williams J.L: Maxillofacial injuries 2nd ed. 1994


Appendix 1

QUESTIONS ASSESSING THE SUBJECTIVE POST TREATMENT DISCOMFORT:

1. How difficult is it for you to manage the following according to your experienced discomfort? (0= no difficulties, 1= mild difficulties 2= moderate 3= with much difficulty 4= impossible without assistance)
   - Maintaining social life?
   - Working?
   - Speaking?
   - Yawning?
   - Chew a piece of meat, apple, or baguette?

THE FOLLOWING OBJECTIVE DATA WAS RECORDED (PRESENT STATUS):

Functional mandibular movement:

Maximum opening capacity (mm):

<table>
<thead>
<tr>
<th>Laterotrusion</th>
<th>Right:</th>
<th>Left:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protrusion:</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Estimation of pain according to Visual Analogue Scale (VAS) (0-10):

At rest:

At movement:

Maximal opening:

<table>
<thead>
<tr>
<th>Laterotrusion</th>
<th>Right:</th>
<th>Left:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protrusion:</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Pain due to palpation (graded 1-3):

<table>
<thead>
<tr>
<th>Muscle/Tissue</th>
<th>Right</th>
<th>Left</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Temporomandibular joint</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The Masseter muscle</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The lateral Pterygoid muscle</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Other findings:

<table>
<thead>
<tr>
<th>Finding</th>
<th>Frontal</th>
<th>Lateral</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open bite</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deviation of opening or closing the jaw</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clicking/crepitation of the jaws</td>
<td>Right</td>
<td>Left</td>
</tr>
<tr>
<td>Asymmetry of the face</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Other:
Handledarintyg

Som handledare för detta projekt tillstyrker jag att studentens eller studenterna ska examineras eftersom dennes/deras prestation och insats i projektet och att den vetenskapliga rapporten är av tillräcklig omfattning och kvalitet för examination.

[Datum]

[Namn Handledare]
[Titel Handledare]