

# Does Extraction or Retention of the Wisdom Tooth at the Time of Surgery for Open Reduction and Internal Fixation of the Mandible Alter the Patient Outcome?

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## Abstract

Whether to extract or retain wisdom teeth present in a fracture line is a controversial topic. This study reviewed the records of all patients who had mandibular wisdom teeth at the time of the injury, and had an open reduction and internal fixation procedure between January 2009 and January 2012. The cohort of patients who concomitantly had their wisdom tooth extracted at the time of fixation had a greater complication rate (24.3%) compared with patients who did not (14.9%). This suggests that if third molars in the line of a fracture have caries, are fractured, show signs of pericoronitis, are periodontally involved, or are interfering with the occlusion are extracted at the time of fixation, this will increase the incidence of complications.

## Keywords

- ▶ wisdom
- ▶ teeth
- ▶ mandible
- ▶ fracture
- ▶ complications

## Preliminary Discussion

Traditionally wisdom teeth in the line of mandibular angle fractures have been extracted. However, it has been experienced that rigid fixation systems and the use of antimicrobial agents have reduced the incidence of infection in cases of teeth in the line of mandibular fractures. Chrcanovic<sup>1</sup> stated that intact teeth in the fracture line should be left in situ if they show no evidence of severe loosening, inflammatory change, if they are partially erupted with no evidence of pericoronitis, or have no periodontal disease.

Ellis<sup>2</sup> found that there is an increased risk for postoperative complications when a wisdom tooth is present, but the increase is not statistically significant. The incidence of postoperative infection and/or the need for plate removal are not affected by

whether the tooth in the fracture is removed. However, in treatment of fractures with extraction of the wisdom tooth in the fracture line versus retention of the wisdom tooth, the complications were dependent on whether the wisdom tooth was previously erupted or unerupted (20.70 vs. 7.69%).<sup>3</sup>

There has been little work performed on whether there is a difference in outcome (complication/no complication) for a patient if they have their wisdom tooth extracted or not at the time of fixation. However, both papers, which have large sample sizes, do not answer this particular question well.

No previous study has been performed to answer this specific question: “Does extraction or retention of the wisdom tooth at the time of surgery for open reduction and internal fixation of the mandible alter the patient outcome?”

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## Body

This study reviewed the records of all patients who had mandibular wisdom teeth at the time of the injury and had an open reduction and internal fixation procedure between January 2009 and January 2012. This study was performed to see whether there was a difference in patient outcome for patients who either retained their wisdom tooth after surgery or had it removed at the time of open reduction and internal fixation. Records of 566 patients were reviewed, and the patients were split into two groups: (1) those who had their wisdom tooth extracted at the time of open reduction and internal fixation and (2) those who retained their wisdom tooth at the time of open reduction and internal fixation. The minimum follow-up period for each patient was 1 year.

Throughout the period of study, the reasons for extraction of wisdom teeth involved with angle of mandible fractures included the following:

1. Caries present within the wisdom tooth
2. Fracture of tooth
3. Evidence of active pericoronitis
4. Periodontal disease
5. Occlusal Interference
6. The reviewed outcomes included the following:
7. If the patient required a return to theater and the reason for this
8. If the patient had a postoperative infection that required treatment with antibiotics
9. If the patient required removal of metalwork (plate) within the first year postoperatively
10. If the patient had a postoperative malocclusion
11. If the patient had a fibrous union/nonunion. This was diagnosed by combined clinical and radiographic means
12. The following factors that may influence outcome were also assessed:
13. The grade of the surgeon performing the surgery
14. If the fracture was unilateral or bilateral
15. The type of fixation used

Patient radiographs, electronic records, and paper records were used to find the data. The records were tallied, tabulated, and statistically analyzed. Patient anonymity was maintained.

## Results

► **Table 1** showed that there was no significant difference between the two groups regarding the proportion of grade of

**Table 1** Grades of surgeon performing the operation

Operator	8 Extracted (%)	8 Not extracted (%)
Consultant	59 (18)	48 (20)
Specialist Registrar	237 (73)	175 (72)
Staff grade	20 (6)	12 (5)
SHO	8 (3)	7 (3)

**Table 2** Fracture pattern—unilateral or bilateral

	8 Extracted (%)	8 Not extracted (%)
Unilateral fracture	40 (12)	35 (14)
Bilateral fracture	284 (88)	207 (86)

surgeon who performed the operations (chi-square test = 0.66,  $p = 0.88$ ). ► **Table 2** demonstrated that there was no difference in both groups regarding the proportion of patients who presented with unilateral or bilateral fractures of the mandible in either group (Fisher Exact Test  $p = 0.531$ ).

► **Tables 3 and 4** are also statistically tested with a Fisher Exact Test. This test shows that there is no statistical difference in the proportion of patients treated with each different modality (four-, six-hole plate, other plate, or intermaxillary fixation) in either the wisdom tooth retained group or the wisdom tooth extracted group. The  $p$  values are 0.865 and 0.9092, respectively, for ► **Table 3** and ► **Table 4**.

► **Table 5** shows that in the cohort of patients who had their wisdom tooth extracted, there is a higher overall complication rate compared with those who retain their wisdom tooth (24.3 vs. 14.9%). This was statistically significant with a Fisher Exact Test ( $p = 0.0060$ ).

Removal of metalwork was required in 3.7% of cases in the extracted wisdom tooth group compared with 2.9% in the retained wisdom tooth group.

The Fisher Exact Test showed that there was a significant difference in the presence of a fibrous nonunion/nonunion in the wisdom tooth extracted group compared with the wisdom tooth retained group (six cases vs. 0 cases) ( $p = 0.0396$ ).

Malocclusion was increased in frequency in the wisdom tooth extracted group (8.6%) compared with (5.0%) in the wisdom tooth retained group, and was close to statistical significance ( $p = 0.0993$ ).

## Discussion

It is well recognized that the presence of mandibular third molars increased the risk of angle fracture.<sup>4</sup> Patients with mandibular third molars present had a 2.1 times greater chance of an angle fracture than did patients without a mandibular third molar present. Because the presence of a mandibular third molar predisposes the patient to a mandibular angle fracture, this suggests that its presence or absence alters the biomechanical properties of the mandible.

► **Table 5** shows that in the cohort of patients who had their wisdom tooth extracted, there is a higher overall complication rate compared with those who retain their wisdom tooth (24.3 vs 14.9%). This is comparable with Seeman et al<sup>5</sup> who found that complication rates in the operative treatment of mandibular angle fractures was 29.5%. The return to theater rate of 6.5%<sup>4</sup> was also comparable with the 6% rate in the extracted wisdom tooth group and 4.1% in the retained wisdom tooth group.

This study shows that individual complications are mostly statistically insignificant between the wisdom tooth

**Table 3** Method of open fixation

	8 Extracted (%)	8 Not extracted (%)
4-hole spaced 2.0-mm plate	262 (81)	188 (78)
6-hole spaced 2.0-mm plate	20 (6)	15 (6)
Other configuration or thickness of plate	42 (13)	39 (16)

**Table 4** Postoperative IMF—used or not

	8 Extracted (%)	8 Not extracted (%)
IMF	53 (16)	41 (17)
No IMF	271 (84)	201 (83)

Abbreviation: IMF, intermaxillary fixation.

**Table 5** Differences in complication rates between wisdom tooth extracted and retained groups

	Extracted (%)	8 Not extracted (%)	Fisher Exact test	Statistically significant (%)
Total cases	324	242	–	–
Post-op infection requiring antibiotics	13 (4.0)	7 (2.9)	0.6464	No
Removal of metalwork required	12 (3.7)	7 (2.9)	0.6452	No
Return to theater	20 (6.0)	10 (4.1)	0.3448	No
Fibrous nonunion/nonunion	6 (1.8)	0 (0.0)	0.0396	Yes
Malocclusion recorded	28 (8.6)	12 (5.0)	0.0993	No
Overall complication rate	79 (24.3)	36 (14.9)	0.0060	Yes

retained group and the wisdom tooth extracted group; however, the rate of complications is statistically significant collectively.

In current practice there is no consensus on whether to extract or retain intact wisdom teeth present in the fracture line. There is conflicting evidence about whether to extract or retain intact wisdom teeth.<sup>2,3</sup> As such there are no difference in fixation guidelines stating cases where the wisdom tooth is retained or extracted.

Champy et al,<sup>6</sup> when producing his eponymous lines of osteosynthesis, confirmed that the mandible's external cortex is strong enough to endure strains resulting from screws and that the plate must be fixed high in the zone of tension. Today, these principles are still taught and are used in mainstream practice. However, Champy et al's work was based on an entirely solid model and had no regard for the removal of a wisdom tooth.

The most frequent radiographic findings included diffuse bone resorption, loosening of screws, and a visible fracture line,<sup>7</sup> associated with a lack of osteosynthesis. It was concluded that most cases requiring surgical retreatment of mandibular fractures comprised nonunion or soft tissue infection associated with screw loosening or plate exposure. Consequently, the main procedures needed included surgical exploration with the removal of fixation

material and new fixation of either a locking plate or a plate of a greater thickness.

When mandibular angle fractures are treated, placing a single monocortical four-hole spaced miniplate across the fracture and using four 6-mm monocortical screws to fix the fracture is an accepted practice. However, in a dual-plate model<sup>8</sup> the Von Mises stresses in the plates and are lower than in a single-plate model. This suggests that the single-plate model is more likely to fail than the dual-plate model. However, clinical studies suggest that dual-plate model confers no advantage over the single-plate model and may even suggest a higher rate of complication.<sup>5,9</sup>

## Conclusion

Our study showed an overall complication rate of 24.3% in the cohort of patients who had their wisdom teeth extracted compared with 14.9% (► **Table 5**) in the cohort of patients who retained their wisdom teeth. There were no cases of nonunion in patients who retained their wisdom teeth at the time of surgery (► **Table 5**). There were also increased rates of infection and the requirement to remove metalwork (► **Table 5**) in the group of patients who had their wisdom teeth extracted.

This study does not truly answer the question about whether or not removal of a third molar in the line of an angle fracture

changes the complication rate, because it is not a randomized, prospective study where third molars are removed on half of the patients. However, based on the data in this study, if third molars in the line of a fracture have caries, are fractured, show signs of pericoronitis, are periodontally involved, or are interfering with the occlusion are extracted at the time of fixation, this will increase the incidence of complication. It is, however, understood that not all wisdom teeth can be retained, as at presentation some wisdom teeth are carious, fractured, avulsed, or have gross periodontal disease.

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