Patients' perceptions of recovery after exposure of impacted teeth with a closed-eruption technique

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This prospective study evaluated patients’ perceptions of recovery after surgical exposure of impacted teeth treated with a closed-eruption surgical-orthodontic technique. Twenty-nine patients (16 female, 13 male; mean age, 16 ± 2.8 years) were given a health-related quality of life questionnaire to be completed each postoperative day (POD) for 7 days. The questionnaire was designed to assess the patient’s perception of recovery: pain, oral function, general activity, and other parameters. The impact of possible predictor variables, such as age, sex, length of surgical procedure, tooth location, height of impaction, and need for bone removal were assessed. Severe pain (27.6%, 13.8%, 3.4%) and consumption of analgesics (76%, 41%, 17%) declined gradually over the first 3 PODs. Improvement in oral function and other symptoms was evident by PODs 3 and 4. Absence from school outweighed interference in daily activity by 3 days (POD 6 vs POD 3). Buccolingual tooth location was the most significant predictor variable, with results showing a delayed recovery for patients with buccally impacted teeth. The most striking difference was reported with regard to swelling (P < .0001), followed by mouth opening (P = .008) and speech (P = .05). When the surgical procedure lasted 30 minutes or longer, there was prolonged recovery from pain (P = .01). This study provides information to patients and clinicians on postoperative recovery after surgical exposure of impacted teeth by the closed-eruption surgical-orthodontic technique. (Am J Orthod Dentofacial Orthop 2004;125:690-6)

The treatment of impacted teeth is a complex procedure; decisions about diagnosis, treatment planning, timing, and execution are made principally by the orthodontist. When the orthodontist requires access to the impacted tooth, the treatment involves close cooperation with the oral surgeon.1

Before requesting a patient’s consent for any treatment, the clinician must inform the patient of the risks and benefits of the proposed procedures, particularly those that pertain to surgery. Legislation today demands a high level of understanding before a signed consent form is considered valid.

When orthodontic treatment requires surgical intervention, patients want to know about the surgical procedure and what to expect during recovery. The most frequent questions refer to postoperative pain and when the patient can return to work or school. The terms quality of life and health-related quality of life (HRQOL) have been increasingly used in the literature in the last decade, covering all medical disciplines.2-8

The location and orientation of impacted teeth, the surgeon’s operative technique, and the patient’s attitude to the surgical intervention vary widely. Most of the information available to both clinicians and patients has been gathered from personal communications between clinicians or anecdotal experiences between friends who underwent similar procedures. Surprisingly, the literature in English does not contain any study focusing on either the immediate postoperative period or patients’ perceptions of the various aspects of recovery from the surgical exposure of impacted teeth. The removal of third molars is a frequently prescribed intraoral operation, and using HRQOL questionnaires to measure subjective postoperative discomfort from this procedure is gaining popularity.2-6,8
Although extracting third molars is a fairly common practice in a representative sample of orthodontic patients, many need to undergo surgical exposure of impacted teeth and request information about potential postoperative discomfort and pain and the return to normal function. Accordingly, the aim of this prospective study was to assess patients’ perceptions of immediate postoperative recovery after the surgical exposure of impacted teeth treated with a closed-eruption surgical-orthodontic technique, in the light of the established experience of the HRQOL questionnaire gained from third-molar extraction surgery.2,6,7

MATERIAL AND METHODS

Two HRQOL questionnaires2,7 were combined for use in this study (Fig 1).

Patients who had been scheduled for surgical exposure of impacted maxillary incisors and canines with a closed-eruption surgical-orthodontic technique were asked to enroll in a prospective clinical study conducted

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**Surgical exposure questionnaire**

In order to improve the quality of care we provide for our patients, it is important for us to know how the surgical exposure has affected you. We ask you to take a few moments to complete this survey form. Every day you will be called over the phone and asked one of the following questions. Please choose the number that corresponds most closely to your assessment over the past 24 hours.

1. Rate the worst pain you have felt during the past 24 hours on a scale from 1 to 10 (1 – not at all, 10 – very much).

For the following questions, please use this system:

- Not at all = 1
- Very little = 2
- A little = 3
- Quite a lot = 4
- Very much = 5

2. Have you taken any medication to relieve pain today?

3. Has it been difficult to swallow today?

4. Has it been difficult to open your mouth today?

5. Were there any foods you could not eat today?

6. Have you enjoyed your food today?

7. Has speech been difficult today?

8. Was it difficult to sleep last night?

9. Have you missed school/work?

10. Has it been difficult to continue your daily activities today?

11. Has there been any swelling today?

12. Has there been bruising today?

13. Has there been bleeding today?

14. Has there been any malaise today?

15. Have you had a bad taste or bad smell today?

16. Has there been any food debris in the operation area today?

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FIG 1. Surgical exposure questionnaire.
in 3 oral and maxillofacial surgery clinics over a 12-month period beginning in January 2001. Patients between the ages of 12 and 20 years and in good general health were included in this study.

On the day of surgery, after consenting to participate in the study, baseline data (age, sex, orthodontist’s name, surgeon’s name, tooth number, and buccal or palatal tooth impaction) were recorded. From the radiographs, the height of the impaction was defined in relation to the area of root of the adjacent erupted teeth; the root area was arbitrarily divided into 3 zones. In this way, the impacted teeth were classified as cervical, middle, and apical.

The surgery was performed according to a standard protocol that included local anesthesia and tooth exposure, as previously described. Rotatory instruments were used when appropriate. The closed-eruption technique requires the bonding of a small eyelet attachment to the impacted tooth at the surgical exposure. In all patients, the mucoperiosteal flap was sutured back to its former place, and a stainless steel pigtail ligature wire, tied into the eyelet, was passed through or under the flap, exiting through the surgical soft tissue midcrestal incision line, as required by the orthodontist. Light orthodontic traction on the ligature wire was immediately begun to bring the tooth to its correct place in the arch. Subsequently, the surgeon recorded details of the surgery, including the need for bone removal, the amount of local anesthetic administered, the duration of the surgical procedure, and the medication prescribed. The modified HRQOL questionnaire was then given to the patient.

The patients were called on the telephone daily for 7 consecutive postoperative days, to encourage them to complete the HRQOL questionnaire. It was designed to assess patient perception of recovery in 4 main areas: pain, oral function, general activity, and other symptoms. Pain definitions referred to the severity of pain and the consumption of analgesics. Oral function dealt specifically with swallowing, mouth opening, ability to eat and enjoy ordinary food, and speech. General activity parameters targeted routine daily activities, sleeping, and school attendance. Other symptoms included bleeding, bruising, swelling, food accumulation in surgical sites, a bad taste or smell, and general malaise. Patients were not required to return for postsurgery visits but were encouraged to do so if symptoms worsened.

For each question, the patients were asked to mark the number best describing how they felt. The degree of pain was assessed on a visual analog scale of 1 to 10. The remaining parameters were assessed on a 5-point scale.

“Recovery time,” defined as the median number of days needed to reach mild pain (1-3 on the 10-point scale) and “not at all/very little” (1-2 on the 5-point scales), was assessed for each parameter examined.

Descriptive statistics were used to summarize “recovery time” by sex, surgical procedure of less than 30 minutes or 30 minutes or longer, the impacted tooth location (buccal or palatal), height of impaction (apical, middle, or cervical), and the need for bone removal during the surgical exposure.

The influence of each predictor variable on the “recovery time” was assessed by a multiple comparisons statistical analysis with the Fisher exact test, with \( P < .05 \) taken as the minimum criterion of significance.

RESULTS

Twenty-nine patients (16 female, 13 male; mean age, 16 ± 2.8 years) underwent the surgical exposure of 34 impacted teeth with a closed-eruption surgical-orthodontic technique; 5 had bilateral impactions. Three orthodontists and 3 maxillofacial surgeons participated in the study. There were 25 impacted maxillary teeth and 9 impacted maxillary central incisors; 19 impacted maxillary teeth were palatal, and 13 were buccal. The remaining 2 impacted teeth were located in the middle of the alveolar crest. As to height of impaction, 11 were located cervically, 10 middle, and 8 apically. Data for the remaining 5 impacted teeth were lacking.

The mean duration of the surgical procedure was 36.4 ± 17.3 minutes. For 12 of the 29 patients, surgery time was longer than 30 minutes, and 15 patients needed bone removal.

On postoperative day (POD) 1, pain was reported as severe (score 8-10 of 10) at some point in the day by 27.6% of the patients; by POD 3, that number had decreased to 3.4% (Fig 2). Consumption of analgesics declined gradually over the first 3 PODs (76%, 41%, and 17%, respectively).

Evaluations of oral function, interference in daily activity, and other symptoms were reported as the percentage of patients who had substantial impairment (score 4 or 5), as follows:

On POD 1, difficulty in eating was the most frequently reported problem (65.5%), followed by inability to enjoy regular food (31.0%), speech difficulty (31.0%), and limitation in mouth opening (20.7%) (Fig 3). Improvement in oral function was evident by POD 4 (difficulty in eating regular food [13.8%], inability to enjoy food [0%], speech [0%], and mouth opening [0%]). Swallowing was the least impaired during the 7 days after surgery, with only 1 patient (3.4%) having major problems on POD 1.
On POD 1, 64.3% of the patients were absent from school, even though only 17.2% reported substantial interference in daily activity (Fig 4). Limitation in daily routine declined to 6.9% (2 patients) by POD 3, whereas absence from school reached 6.9% only by POD 6. Sleep was minimally affected during the entire postsurgical period.

Swelling was the major distressing postoperative symptom. It peaked by POD 1 (34.4%) but resolved by POD 4 (3.4%). A bad taste or smell was reportedly the greatest on POD 1 (24.1%), diminishing gradually over the study period. Bleeding (20.6%) and malaise (10.3%) were of major concern to patients only on the first day after surgery (Fig 5). Bruising and food accumulation at the surgical site were only marginally evident to the patients in the recovery period.

Recovery time, as reflected by pain and the ability to eat and enjoy regular food, required 3 days to reach minimal levels; mouth opening, swelling, bad taste or smell, school attendance, and consumption of analgesics required 2 days; and, within 1 day, all other measures attained minimal levels (Fig 6). No patient returned for a postoperative visit with aggravated symptoms.

The influence of predictor variables on “recovery time” was assessed. Recovery was not significantly affected by sex, need for bone removal, and height of the impaction. However, patients whose surgical procedure lasted beyond 30 minutes reported a prolonged recovery from severe pain compared with those whose procedure was less than 30 minutes (POD 4 vs POD 2, \( P < .01 \)). Buccolingual tooth location was the most significant predictor variable, resulting in delayed recovery for the buccally impacted teeth. The most striking difference was reported for swelling in the buccal impaction group; it returned to minimum values only at POD 4 compared with POD 1 in the palatally impacted group (\( P < .0001 \)). Additional factors included mouth opening (POD 3 vs POD 1, \( P = .008 \)) and speech (POD 4 vs POD 1, \( P = .05 \)). (Fig 7)
DISCUSSION

Regardless of the surgical method used to expose an impacted tooth, it is reasonable to assume that it will have an adverse influence on several aspects of HRQOL. Nevertheless, no qualitative study in the literature has defined the difficulties that a patient undergoing these procedures can expect in the immediate PODs.

This study focused on the patients’ perceptions of the postoperative outcome and not on the clinicians’ perceptions, because patients are better assessors of their own HRQOL. The patient must live with any discomfort, usually without the clinician’s intervention. Postoperative difficulties might be considered unimportant by the clinician, but, to the patient, they can cause discomfort and suffering.

The patient sample for this study was young, with a slight preponderance of females (55%). To provide subjective information regarding the aftereffects of the surgical exposure of impacted teeth treated with a closed-eruption surgical-orthodontic technique, the results should be compared with a common oral surgery baseline procedure. Despite the many differences between the 2 procedures, third-molar surgery is the only available procedure for which such assessments have been made.

This comparison shows that recovering oral function took longer after third-molar surgery. Eating was affected in 65.5% of the patients in our sample and reached minimal levels within 3 days. Similarly, the inability to enjoy food, which had affected 31% of the sample, reached minimal levels within a 3-day period. Restriction of mouth opening was present in 20.7% of the sample, but it had almost disappeared within 2 days of the procedure. Speech and swallowing did not seem to pose special problems in our patients.

Third-molar surgery produced contrasting results. Difficulties in eating returned to minimal levels only after 6 days, in mouth opening after 5 days, and in speech after 2 days, but they affected a larger part of the study population (85%, 78.5%, and 37.5%, respectively). It was surprising to see that, even though limitations in daily activity subsided by POD 3, school attendance returned to normal only by POD 6 in this study. Comparing this data with the third-molar study shows that adult patients reported similar dynamics for returning to work. However, they reported a return to work on POD 3, despite the more traumatic surgical intervention. One might be tempted to speculate that the adolescents in our study had less altruistic reasons for absenteeism than the more responsible adults. Perhaps the temptation to miss 3 additional days of school, with questionable justification, was too difficult to resist.

Sleeping habits were minimally affected for both surgical exposure of impacted teeth treated with a closed-eruption surgical-orthodontic technique and third-molar surgery.

Swelling was greatest in the present study on POD 1, was resolved by POD 4, and affected only 34.4% of the study group. In third-molar surgery, the peak was reached on POD 2 and resolved on POD 5, affecting 61% of that group. The fact that third-molar surgery is more traumatic and involves a different anatomic area might explain the differences. Malaise, bleeding, and bruising are not cited as factors for either surgical procedure. A bad taste or smell was considered minimal after a median of 2 days and affected 24.1% of the present sample. Food accumulation at the surgical site was negligible. In sharp contrast, these recovery factors were regarded as major concerns after third-molar surgery, lasting 7 days before they reached acceptable levels. This discrepancy might be explained by the fact that healing by secondary intention generally occurs after third-molar surgery versus healing by primary intention in the impacted teeth in the present study, encouraged by the closed surgical procedure.

The dynamics of worst pain (maximum pain on POD 1 and significant improvement by POD 3) in the present sample and after third-molar surgery were similar, even though third-molar surgery is much more traumatic, taking up to 9 days to reach minimal levels.

In general, although the adverse effects in the present study subsided after 3 days, they frequently persisted beyond a week in third-molar–surgery patients.

Only 2 predictor variables significantly affected recovery. First, duration of the surgical procedure was directly related to duration of postoperative pain; this was similar to the findings after third-molar surgery.
Second, a surprising finding of the present study was that patients with buccally impacted teeth experienced delayed recovery from swelling, restriction of mouth opening, and affected speech. This might be due partially to the need to sever paranasal and oral musculature during a buccal surgical approach while the healing surgical flap is seated in highly mobile oral mucosa. This is in direct contrast to a palatal approach, in which muscles are not severed, and the flap consists of bound, attached mucosa. The present study describes several parameters related to recovery after surgical exposure of impacted maxillary teeth treated with a closed-eruption surgical-orthodontic technique from the patient’s perspective. However, the data were generated from a relatively small sample of patients. When further HRQOL data evaluating different parameters of the surgical exposure of impacted teeth become available, studies can be designed to objectively measure the impact of various clinical practices (eg, use of preoperative steroids, analgesics, mouth rinses), which are typically adopted empirically to reduce patients’ postoperative discomfort and to speed up recovery and the return to normal activity.

CONCLUSIONS

Within the limits of this study, it can be concluded that:

1. Patients should expect, in general, recovery within 3 days after surgical exposure of impacted maxillary teeth treated with a closed-eruption surgical-orthodontic technique.

2. Teenagers will unnecessarily absent themselves from school for 6 days, although most could justifiably return to school at POD 4.

3. A surgical exposure in excess of 30 minutes will result in a prolonged period of severe pain.

4. Patients with buccally impacted teeth will have a longer recovery compared with those who had palatally impacted teeth.

5. Additional and larger HRQOL studies should evaluate other factors to understand recovery after surgical exposure of impacted teeth.

These findings can be used to provide information for the patient to evaluate, together with the more direct factors about the treatment options. These findings have particular relevance to the need for informed consent and can allow the patient to better plan his or her activities for several days after the procedure.

REFERENCES


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