ORIGINAL RESEARCH

Complications of exodontia: A retrospective study

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ABSTRACT

Purpose: The purpose of this study was to analyze the incidence of various complications following routine exodontia performed using fixed protocols.
Materials and Methods: A total of 22,330 extractions carried out in 14,975 patients, aged between 14 and 82 years, who reported to the Department of Oral and Maxillofacial Surgery at Padmashree Dr. D. Y. Patil Dental College and Hospital, Nerul, Navi Mumbai, were evaluated for various complications.
Results: The most common complications encountered were tooth fracture, trismus, fracture of cortical plates and dry socket. Wound dehiscence, postoperative pain and hemorrhage were encountered less frequently. Luxation of adjacent teeth, fracture of maxillary tuberosity, and displacement of tooth into adjacent tissue spaces were rare complications.
Conclusion: The practice of exodontia inevitably results in complications from time to time. It is imperative for the clinician to recognize impending complications and manage them accordingly.

Key words: Complications, dry socket, exodontia, tooth displacement

Exodontia is the most common surgical procedure performed in the speciality of Oral and Maxillofacial Surgery.

Complications are unforeseen events that tend to increase the morbidity, above what would be expected from a particular operative procedure under normal circumstances.[1] Though they are rare, their occurrence leads to a prolonged phase of treatment, which is cumbersome to the patient as well as the clinician.

The dictum that to prevent a complication from occurring is the best way to manage one remains time tested. Thus, it becomes imperative that the clinician is aware and recognizes the whole spectrum of complications and their implications.

Complications can be wide, ranging from common ones like dry socket and root fracture to uncommon and serious ones like displacement of a root fragment in the maxillary sinus and oro-antral fistula [Table 1].

Careful attention to details including a thorough case history, routine investigations like radiographs and blood investigations is an inherent part of exodontia. Adjunctive investigations like a Cone Beam Computed Tomography (CBCT) scan can be performed to assess the difficulty of a case. These investigations can pre-warn a clinician about any impending complication.

The purpose of this study was to analyze the incidence and distribution of complications following routine extractions performed in the Department of Oral and Maxillofacial Surgery at Padmashree Dr. D. Y. Patil Dental College and Hospital, Nerul, Navi Mumbai.

MATERIALS AND METHODS

A retrospective study of 22,330 extractions carried out in 14,975 patients who reported to the Department of Oral and Maxillofacial Surgery at Padmashree Dr. D. Y. Patil Dental College and Hospital was conducted.

The study included 8464 males and 6511 females, with age ranging from 14 to 82 years with a mean age of 41 years.

Only healthy individuals were included in the study. Medically compromised patients, pregnant and lactating mothers were excluded from this study.

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Only simple extractions requiring simple elevation and forceps application were included in the study. More complex extractions requiring reflection of soft tissue flaps and surgical bone removal for extraction of the teeth were excluded from the study.

The causes for the extraction of teeth have been enumerated in Table 2. The anatomic distribution of the extracted teeth has been shown in Table 3.

In all cases, 2% lignocaine hydrochloride with 1:80,000 adrenalin solution was used to provide anesthesia.

Local infiltration, infraorbital nerve block, posterior superior alveolar nerve block or inferior alveolar nerve block were used depending upon the anatomic distribution of the teeth to be extracted.

A maximum of 5 ml of local anesthetic solution was injected in each patient.

All patients in the study group were prescribed antibiotics and analgesics and explained about wound care postoperatively.

Postoperatively; all patients were prescribed antibiotics, i.e. amoxycillin (250/500 mg) or a combination of amoxycillin (250 mg) + cloxacillin (250 mg), depending on the severity of the infection.

All patients were prescribed antibiotics postoperatively as all the extractions were performed by undergraduates and interns, resulting in longer, more traumatic extractions, increasing the risk of secondary infection or an acute exacerbation of existing infection. Also, as caries and periodontitis were the major causes for tooth extraction, the patients presented with pre-existing infection that needed to be controlled.

Patients were asked to resume oral hygiene habits (tooth brushing two times per day) 24 hours postoperatively.

Tobacco smoking history was not included in this study.

In cases where suturing was required, 3-0 silk was used to achieve closure.

The cases were distributed randomly to the operators.

The extractions carried out were evaluated for the following complications:

- Fractured tooth
- Laceration
- Soft tissue injury
- Luxation of adjacent tooth/teeth
- Fracture of cortical plates
- Fracture of maxillary tuberosity

Table 1: Articles showing incidence of complications of simple tooth extraction

Topic	Journal
Dry socket	SADJ 2008;63:490,492-3
Does prophylactic administration of systemic antibiotics prevent postoperative inflammatory complications after third molar surgery?	J Oral Maxillofac Surg 2007;65:177-85
Incidence and pattern of presentation of dry socket following non-surgical tooth extraction	Nig Q J Hosp Med 2007;17:126-30
Incidence of dry socket, alveolar infection, and postoperative pain following the extraction of erupted teeth	J Contemp Dent Pract 2010;11:E033-40
Prevalence of complications of simple tooth extractions and its comparison between a tertiary center and peripheral centers study conducted over 8,455 tooth extractions	JNMA J Nepal Med Assoc 2007;46:20-4
Influence of trans-operative complications on socket healing following dental extractions	J Contemp Dent Pract 2007;8:52-9
Topical antibiotic prophylaxis for bacteremia after dental extractions	Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2001;91:162-5
Bacteremia following tooth extractions	Rev Stomatol Chir Maxillofac 1976;77:849-56
Pain experience after simple tooth extraction	J Oral Max Surg 2008;66:911-7

Table 2: Cause for extraction of tooth

Cause	Number of extractions	Percentage
Caries	6763	30.3
Periodontitis	6242	27.9
Orthodontic	3304	14.8
Trauma	1753	7.9
Endodontic failure	1512	6.8
Non-functional	1319	5.9
Iatrogenic	720	3.2
Miscellaneous	717	3.2

Table 3: Anatomic distribution of teeth extracted

	Maxillary anteriors	Maxillary posteriors	Mandibular anteriors	Mandibular posteriors
Number of teeth	5140	6252	3568	7370
Percentage	23	28	16	33

Anterior = central incisor to canine, posterior = first premolar to third molar

- Fracture mandible
- Hemorrhage
- Displacement of tooth/root in the maxillary antrum
- Displacement of tooth/root into adjacent tissue space
- Dry socket
- Trismus
- Postoperative pain
- Infection
- Wound dehiscence

Fractured tooth included crown and/or root fracture.

Hemorrhage included only primary hemorrhage.

Cortical plates included both buccal (labial) and lingual (palatal) plates.

Dry socket was defined as postoperative pain inside and around the extraction site, which increased in severity at any time between the first and third day after the extraction, accompanied by a partial or total disintegrated blood clot, with or without halitosis.

Healing was assessed by clinical examination of the patient, as well as patient feedback regarding pain, halitosis, dysgeusia, etc.

RESULTS

Between October 2007 and September 2010, 23,242 extractions were carried out in 15,817 patients in the Department of Oral and Maxillofacial Surgery [Figure 1].

Extractions in medically compromised/pregnant/lactating patients = 912 extractions in 842 patients.

Sample size = 22,330 extractions in I4,975 healthy patients [Figure 2].

Table 4: Incidence of the complications

Complication	Number
Fractured tooth	4566
Lacerations	902
Soft tissue injuries	1818
Fracture of cortical plates	3607
Trismus	4023
Dry socket	2618
Wound dehiscence	779
Postoperative pain	864
Hemorrhage	289
Fracture of maxillary tuberosity	112
Luxation of adjacent tooth	28
Fracture mandible	0
Displacement of tooth into maxillary sinus	9
Displacement of tooth into adjacent spaces	12
Infection	86

Table 5:Distribution of the complications between interns and undergraduates

Student	No of extractions (%)	No of complications (%)	Chi-square value	*P* value
Intern	10,718 (48)	7291 (37)	518.098	0.000
Undergraduate	11,612 (52)	12,422 (63)		
Total	22,330	19,713		

Complications

The complications noted are given in Tables 4-7 and Figures 3-7.

Thus, in this study, it is seen that the major causes of extraction were caries and periodontitis, followed by orthodontic purposes, trauma and endodontic failure.

The largest number of extractions was carried out in the mandibular posterior segments, followed by the maxillary posterior segments, the maxillary anteriors and finally the mandibular anteriors.

Also, it was observed that the fracture of tooth is the most common complication, followed by trismus, fracture of cortical plates and dry socket. Wound dehiscence, postoperative pain and hemorrhage showed a medium incidence. Luxation of adjacent teeth, displacement of tooth into maxillary antrum/adjacent tissue spaces, infection and fracture of maxillary tuberosity were comparatively rare complications.

No cases of fracture mandible were recorded.

A higher incidence of complications was seen when undergraduates carried out the extractions, compared to the interns; when the operative time exceeded 30 minutes as compared to procedures completed within 30 minutes; and when the extractions were carried out in the mandibular arch as compared to the maxillary arch.

DISCUSSION

Although careful attention to surgical details, including proper patient preparation, asepsis, and meticulous management of hard and soft tissue, controlled force when applying surgical instruments, hemostasis and adequate postoperative instructions, may help to reduce the rate of complications, it has not been found to eliminate them.

The factors that contribute to such complications are numerous and include the patient or may be tooth related, and also include the surgeon's operative experience.[2,3] Other factors found to affect the complication rate include age[4] and gender[5] of the patient.

Table 6: Relation between time taken for the procedure and number of complications

Time taken for the procedure	Number of extractions (%)	Number of complications	Percentage of complications	Chi-square value	*P* value
0–30 min	10,940 (49)	6898	35	839.574	0.000
30–60 min	11,390 (51)	12,815	65		

Table 7: Incidence of complications in maxilla and mandible

Location of teeth	No of teeth extracted (%)	No of complications (%)	Chi-square value	*P* value
Maxilla	11,392 (51)	8873 (45)	151.009	0.000
Mandible	10,938 (49)	10,840 (55)		

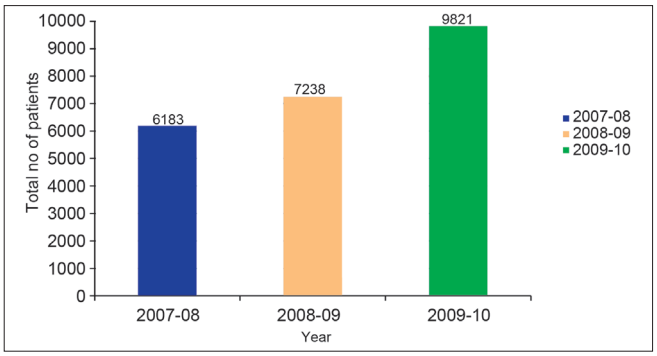

Figure 1: Total no. of patients from October 2007 to September 2010

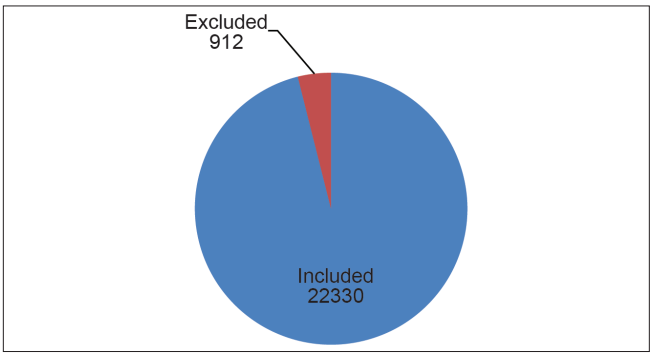

Figure 2: Excluded and included patients

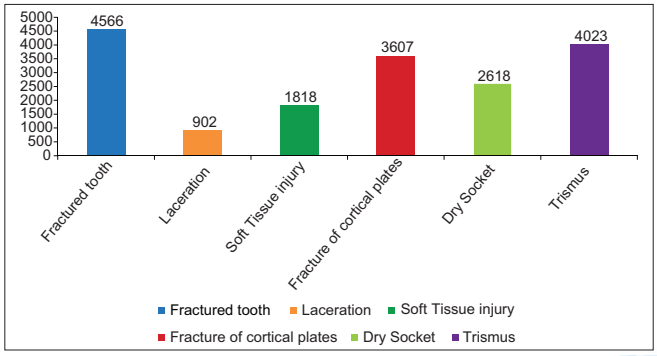

Figure 3: Bar graphs showing a comparison of the complications occuring with a high frequency

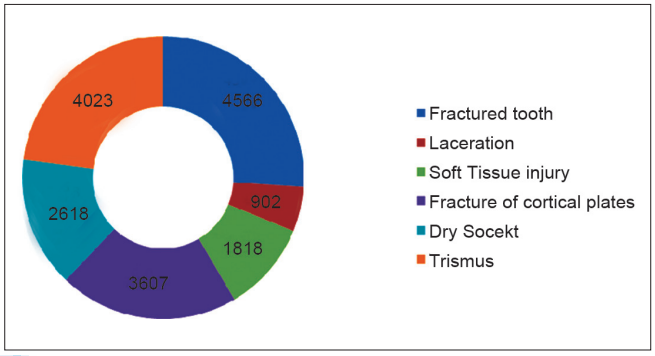

Figure 4: Donut chart showing a comparison of complications occuring with a high frequency

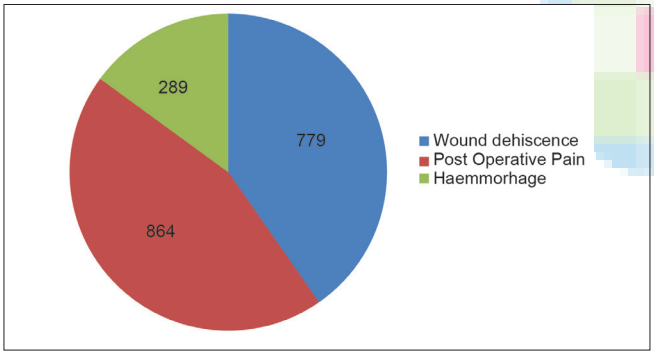

Figure 5: Pie chart showing a comparison of complications occurring with a medium frequency

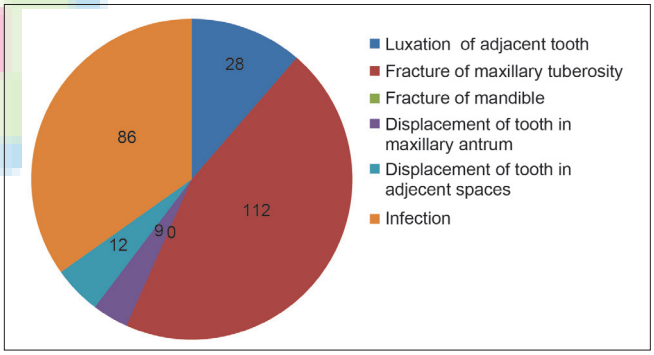

Figure 6: Pie chart showing a comparison of complications occurring with a low frequency

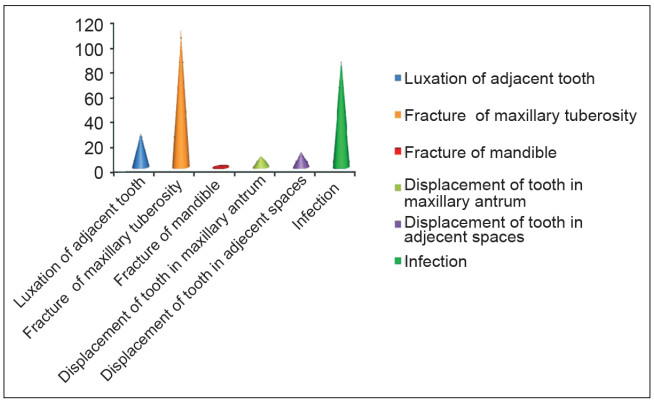

Figure 7: Conical graph showing a comparison of complications occurring with a low frequency

This study shows a higher incidence of tooth fracture (20.4%), trismus (18%), fracture of cortical plates (16.2%) and dry socket (11.7%).

It was seen that in majority of the cases of fracture of cortical plates, it was the buccal plate that was fractured, while the lingual and palatal cortical plates were fractured only in a few instances.

The incidence of dry socket for routine dental extractions has been reported to be in the range of 5–20%,[6-9] while its incidence after extractions of third molar varies from 1 to 37.5%.[10,11] Increased occurrence is seen in smokers[12-14] and patients on oral contraceptives.[15-17]

Trismus is an objective finding, and thus difficult to measure objectively despite being readily observable.[18]

Postoperative pain (3.9%), wound dehiscence (3.5%) and hemorrhage (1.3%) were the less frequent complications.

A 100-mm visual analogue scale (VAS) was used for the assessment of postoperative pain,[19] 2 days and 7 days postoperatively. The patients described the character of pain as constant, shooting, or dull while chewing. The assessment was done within 15 min of administration of the pain medication.

Fracture of maxillary tuberosity (0.5%), infection (0.4%), fracture mandible, luxation of adjacent tooth (0.13%), displacement of tooth into adjacent tissue spaces (0.05%) and displacement of tooth into maxillary sinus (0.04%) were some of the rarer complications.

The maxillary tuberosity is an important retentive area for maxillary complete dentures and every effort must be made to preserve it.

The accidental displacement of teeth into fascial spaces constitutes an unusual complication. However, there are reports in the literature of displacement of teeth into the infratemporal fossa,[20] maxillary sinus,[21] submandibular space,[22] pterygomandibular space,[23] lateral pharyngeal space,[24] and lateral cervical region.[25]

A higher incidence of complications was probably seen as the operators were the lesser experienced undergraduates and interns. Also, a higher incidence of complications was seen when extractions were carried out by undergraduates (63%), as compared to interns (37%).

The amount of time required to complete the procedure was also a contributing factor, as a higher incidence of complications was seen in the procedures requiring 30–60 min for completion (65%), as compared to the procedures that were completed within 30 min (35%).

Also, a higher incidence of complications was seen in extractions carried out in the mandible (55%), as compared to the maxilla (45%). This could be attributed to the fact that trismus and dry socket, which made up a major chunk of the complications, occurred in the mandible.

CONCLUSION

The practice of exodontia inevitably results in complications from time to time. These complications range from simple ones like dry socket to ones like displacement of a tooth in the maxillary sinus.

The clinician must possess the clinical acumen to recognize impending complications and manage them accordingly. Following the axiom "prevention is better than cure"[26] still remains the best way to manage any complication.

Undergraduate includes third and final year students

Null hypothesis

There is an association between column and row attributes

Interpretations

Since *P*-value is very small and less than 0.05, we reject null hypothesis of no association and conclude that there is relationship between column and row attributes, i.e. operator experience, time taken for the procedure, arch in which the procedure is performed and number of extractions and number of complications

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