

Investigation of predisposing factors for complications following tooth extraction

Thesis Booklet

Dr. Alexandra Jurásek

Supervisor:

Dr. Krisztián Katona

Co-supervisor:

Dr. Balázs Attila Sándor

Head of Program:

Prof. Dr. Edina Lempel

Head of Doctoral School:

Dr. Lajos Bogár



PTE

1367

University of Pécs

OGYDHT Pécs

Department of Dentistry and Oral Surgery

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Introduction

Tooth extraction is one of the most frequently performed procedures in everyday dental practice; however, it may be associated with a number of intraoperative and postoperative complications. Among these, oroantral communication (OAC) is of particular importance, as it may occur during the extraction of maxillary teeth.

The development of OAC not only complicates the surgical procedure but may also compromise wound closure and healing. If left untreated, it can lead to chronic oroantral fistula formation and odontogenic maxillary sinusitis. The proper management of this complication often requires advanced surgical skills and specialized infrastructure, which may not be available at all levels of care.

The Hungarian dental care system is divided into primary and specialized care. The accessibility and workload of specialized care vary considerably across regions. Therefore, dentists' decisions regarding referral to specialized care are influenced not only by clinical and radiological factors but also by available resources,

professional experience, and the structure of the healthcare system.

Consequently, there is a particular need for reliable and easily applicable risk assessment methods that can support clinicians in selecting the appropriate treatment strategy. The preoperative prediction of oroantral communication allows for more conscious surgical planning, the provision of appropriate instruments and conditions, and, when necessary, timely referral of patients to specialized care.

In this process, radiological imaging plays a key role. Panoramic radiography, as a widely available diagnostic tool, may provide valuable information for risk assessment when evaluated using a standardized approach.

Based on the above, the aim of the present study was to identify clinically applicable risk assessment methods that support clinical decision-making in everyday dental practice.

Aims

The aims of the present study were:

1. To identify radiological and clinical parameters that can predict the occurrence of oroantral communication based on routinely obtained panoramic radiographs.
2. To evaluate dentists' decision-making processes using a questionnaire, with special emphasis on the use of imaging modalities, preparedness for managing complications, and referral practices to specialized care.

Materials and Methods

Our retrospective case–control study was conducted at the Department of Dentistry and Oral Surgery, University of Pécs. Panoramic radiographs obtained between 2019 and 2021 were analyzed. Cases were identified from the Medsol system based on the procedural code for “surgical closure of oroantral communication” (TB140), while the control group consisted of cases involving the same tooth types without complications.

During the radiological analysis, several morphological and topographical parameters were evaluated, including the relationship between the tooth roots and the maxillary sinus, the extent of root protrusion, tooth angulation, the presence of a sinus recess, and the distance between the alveolar bone level and the cementoenamel junction (CEJ).

Specific inclusion and exclusion criteria were applied in the study.

Radiological measurements were performed in a standardized manner using digital measurement tools based on predefined anatomical reference points. In

multirooted teeth, each relevant root was evaluated separately, and composite values were calculated based on the predefined parameters.

Statistical analysis included several methods. In addition to binary logistic regression, decision tree and random forest models were applied, enabling the ranking of predictive variables. Associations between variables were assessed using correlation analyses.

The aim of the questionnaire-based survey was to explore dentists' clinical decision-making. The questionnaire included items related to the use of imaging modalities, the recognition and management of complications, and referral practices to specialized care.

Results – Theses

Oroantral communication

1. The mesial distance between the alveolar bone level and the cemento-enamel junction is a significant predictor of OAC; with each 1 mm increase, the odds of OAC decreased (OR = 0.721).
2. The extent of root protrusion into the maxillary sinus significantly increases the risk of OAC; each 1 mm increase was associated with a 1.22-fold increase in risk, with a threshold value of 3.3 mm identified by decision tree analysis.
3. The presence of a mesial adjacent tooth is a significant protective factor, reducing the likelihood of OAC (OR = 0.495).
4. Decision tree analysis identified tooth angulation and the presence of a sinus recess as independent predictive factors in the development of OAC.
5. The presence and extent of periapical inflammation showed no significant association with OAC ($p > 0.05$).
6. A high level of interobserver agreement was achieved using standardized radiological evaluation criteria ($\kappa > 0.81$).

Dentists' experience with post-extraction complications and their decision-making and referral practices

1. The questionnaire-based analysis demonstrated that clinical decision-making is influenced by professional experience and the availability of imaging modalities.
2. More experienced dentists are more likely to refer suspected OAC cases to specialized care ($p=0.130$), while less experienced practitioners tend to rely more frequently on preoperative imaging ($p=0.008$).

Conclusions

Based on our results, radiological parameters identifiable on panoramic radiographs may be suitable for assessing the risk of developing oroantral communication. The clinical relevance of the predictive factors identified in this study lies in their potential to enable dentists to estimate the risk of complications prior to the intervention.

The implementation of a standardized radiological evaluation system may support clinical decision-making, improve treatment planning, and facilitate the appropriate selection of the level of care. This is particularly important in cases where the management of complications requires advanced surgical expertise.

The results of the questionnaire-based survey demonstrated that clinical decision-making is significantly influenced by professional experience and the availability of diagnostic tools. The routine application of preoperative risk assessment may contribute to more conscious patient management and more appropriate referrals to specialized care.

Based on our literature review, the present study is of a gap-filling nature, as it investigates the prediction of oroantral communication using routinely obtained panoramic radiographs, without focusing exclusively on third molars.

Our findings may contribute to improving the safety of dental care and promoting a more conscious approach to the management of complications.

Publications

Publications related to the thesis:

Jurásek A, Farkas N, Frank D, et al (2024) Evaluation of clinical and radiographic warning signs for prediction of oroantral communication following tooth extractions. Clin Oral Investig 28:609. <https://doi.org/10.1007/s00784-024-06000-x>

Jurásek A, Katona K, Borbásné Farkas K, Sándor BA (2026) Fogorvosi döntések a szövődmények árnyékában: kockázatbecslési és ellátási stratégiák feltérképezése. Orv Hetil 167:148–155. <https://doi.org/10.1556/650.2026.33470>

Other publications:

Radacsi A, Katona K, **Jurasek A**, et al (2026) Feeding Practices, Prenatal Oral Health Information, and Early Childhood Caries in Toddlers Born Before and During the COVID-19 Pandemic: A Cross-Sectional Study from Hungary. Dent J (Basel) 14:101. <https://doi.org/10.3390/dj14020101>