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# Application and evaluation of coronectomy in Switzerland

#### KEYWORDS

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 Survey  
 Acceptance  
 Switzerland

#### SUMMARY

Coronectomy is the intentional partial removal of a tooth. Thereby the crown of the tooth is removed and the roots are left in place. Compared to the complete operative removal of a wisdom tooth, the incidence of inferior alveolar nerve injury (IANI) is lower. The aim of this study is a survey on the use and acceptance of wisdom tooth coronectomy in Switzerland. An anonymous questionnaire was sent to 266 dentists specialized in oral surgery or maxillofacial surgeons; 58.3% of the questionnaires were returned and could be assessed. The statistical analysis was performed using Fisher's exact test. The technique was classified as "non-reliable" by 51.6% of the respondents. In cases manifesting a high risk of IANI,

40.6% offered the patient a coronectomy. In a tooth exhibiting a high risk of IANI, 69.0% could envisage to perform a coronectomy instead of a complete operative removal. The technique was not used by 54.8%. A significantly larger proportion of study participants who specialized in or after the year 2005 ( $p < 0.05$ ) rated the technique as "reliable". The same applied to respondents who specialized in Bern ( $p < 0.05$ ) and those who already had used coronectomy ( $p < 0.001$ ). In conclusion, our results show that the majority of maxillofacial and oral surgeons reject coronectomy. In view of recent studies, this attitude should be reconsidered.

## Introduction

The operative removal of wisdom teeth belongs to the most frequent interventions in oral surgery (COULTHARD ET AL. 2014). A possible complication is inferior alveolar nerve injury (IANI). Its incidence amounts to 0.35%–8.4% (SARIKOV & JUODZBALYS 2014). For a reduction of this risk alternative techniques are discussed. One of them is the intentional partial surgical removal, the so-called coronectomy. In this surgical procedure the tooth crown is removed and the block of roots left in place. In the literature the technique has already been described in 1984

(ECUYER & DEBIEN 1984). As opposed to the complete operative removal the coronectomy exhibits a tenfold lower incidence of IANI (LONG ET AL. 2012). Regarding pain and infections no significant difference exists between the coronectomy and the complete operative removal (CERVERA-ESPERT ET AL. 2016). The postoperative quality of life does not differ between the two procedures (MANOR ET AL. 2016). In case of a very critical positional relationship between the third molar roots and the nerve the coronectomy lends itself as therapeutic alternative. In three-dimensional imaging signs of a high risk of IANI are



apparent in the coronal plane and include the absence of cortical bone between the dental root and the nerve canal as well as the constriction of the mandibular canal where it passes by the tooth root (NAKAMORI ET AL. 2014; SELVI ET AL. 2013; SHIRATORI ET AL. 2013). Since following a coronectomy the roots frequently migrate towards the alveolar crest and hence away from the nerve, the root block can be completely removed with a low risk of nerve damage, if this should be necessary later (MARTIN ET AL. 2015).

The aim of the present study is a review of the application and acceptance of coronectomy among specialist dentists and oral and maxillofacial surgeons practicing in Switzerland.

## Materials and Methods

The study participants were recruited using the MedReg register of medical professions of the Swiss Federal Office of Public Health (FOPH), the published membership list of the Swiss Society for Oral Surgery and Stomatology (SSOS), and the internet presence of the advanced training facilities. At the end of December 2016 an anonymous questionnaire (Tab. 1) and an accompanying letter in German and French as well as a stamped addressed envelope were delivered by mail. The questionnaire was subdivided into demographic data and professional questions. The questions comprised the acceptance and application of coronectomy as well as the personal attitude towards the procedure. The criteria for a high risk of IANI upon the operative removal were not defined and the assessment was left to the interviewee. Returned questionnaires were analyzed and answers transferred into a database (Excel for Mac 2011, Microsoft, Redmond, Washington, USA). Statistical analyses were carried out using the software R (Version 3.3.1, www.r-project.org). The statistical significance of differences was tested by means of Fisher's exact test.

## Results

From the questionnaires delivered by mail ( $n = 266$ ), 59.0% ( $n = 157$ ) were returned and 58.3% ( $n = 155$ ) could be evaluated. Two questionnaires had to be excluded because of inaccurate information regarding the specialization of the interviewees.

### Demographic data

Among the respondents 60.0% ( $n = 93$ ) were specialist dentists for oral surgery and 28.4% ( $n = 44$ ) specialists for maxillofacial surgery. Both specializations were owned by 11.6% ( $n = 18$ ) of the interviewees. The average age of the participants amounted to 49.2 years (32–74 years, SD 9.5 years). The time since the latest specialization on average was 13.5 years (1–39 years, SD 8.5 years). The specialization was acquired in Bern by 21.9% ( $n = 34$ ), in Basel by 20.6% ( $n = 32$ ), in Zurich by 16.8% ( $n = 26$ ), in Lucerne by 5.8% ( $n = 9$ ), in Geneva by 3.9% ( $n = 6$ ), in Lausanne by 1.9% ( $n = 3$ ), and abroad by 27.1% ( $n = 42$ ). Because of missing information three persons (1.9%) could not be assigned to an advanced training facility.

### Professional questions

In case of an uncertain positional relationship of lower third molars to the mandibular canal, 97.4% ( $n = 150$ ) of the respondents applied three-dimensional radiographic diagnostics (computed tomography or cone-beam computed tomography). In case of wisdom teeth associated with a high risk of IANI, patients were offered an operative removal by 93.5% ( $n = 145$ ), leaving or waiting by 79.4% ( $n = 123$ ), a coronectomy by 40.6%

( $n = 63$ ), a referral to a specialist by 12.9% ( $n = 20$ ), and an orthodontic extrusion by 2.6% ( $n = 4$ ; multiple entries possible; Fig. 1). The surgical procedure of coronectomy was known to 93.5% ( $n = 145$ ). Coronectomy was rated as “non-reliable” by 51.6% ( $n = 80$ ; Fig. 2), while 42.6% ( $n = 66$ ) considered the technique “reliable”. This question was not answered by 5.8% ( $n = 9$ ). The procedure was rated as “reliable” by 54.3% of the respondents who specialized in or after the year 2005, while 45.7% regarded it as “non-reliable” (Fig. 3). If the specialization was obtained before the year 2005, 38.6% rated the procedure as “reliable” and 61.4% as “non-reliable”. The assessment of the reliability of coronectomy as a function of the place of specialization can be taken from Figure 4. In case of a tooth at high risk of IANI upon the operative removal 69.0% ( $n = 107$ ) were

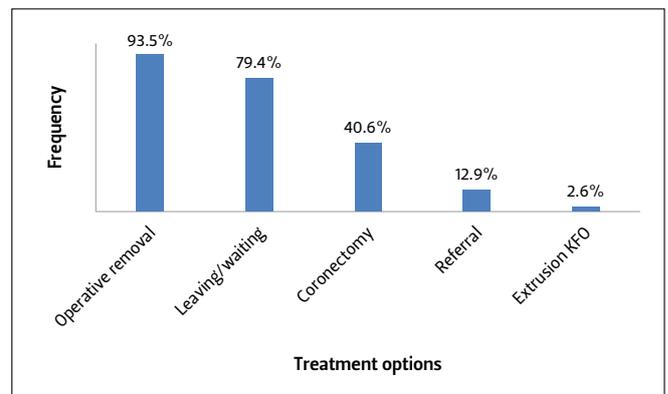


Fig. 1 Treatment options offered in cases of wisdom teeth at high risk of IANI (multiple entries possible; KFO: orthodontic)

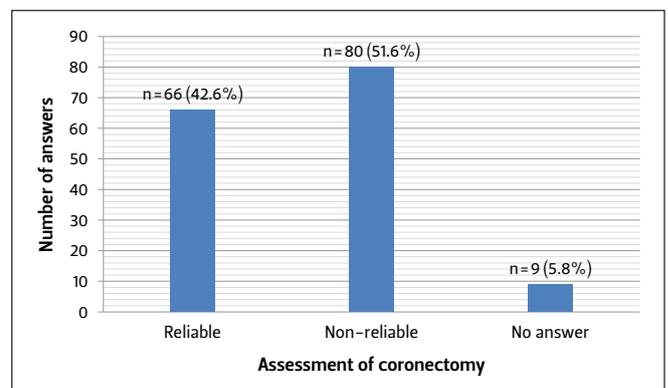


Fig. 2 Assessment of coronectomy

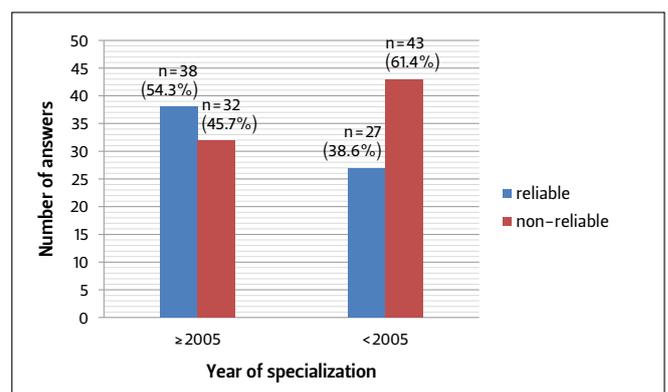


Fig. 3 Assessment of the reliability of coronectomy dependent on the year of specialization ( $n = 140$ , no answer = 15)

**Tab.1** Questionnaire

Question	Predefined answer
Year of birth	
Year of graduation in dentistry	
Place of work (canton)	
Year of graduation in advanced training	
Place of advanced training	Basel
	Bern
	Lausanne
	Lucerne
	Geneva
	Zurich
	Other (country):
Are you currently clinically active as	Specialist dentist for oral surgery
	Specialist physician for maxillofacial surgery
	Dentist (without advanced training title of oral surgery)
Do you use three-dimensional imaging (CT/CBCT) for diagnostics of wisdom teeth with unclear positional relationship to the mandibular canal? (one selection)	Yes
	No
What options do you offer to patients having mandibular wisdom teeth in close positional relationship to the inferior alveolar nerve and at risk of nerve damage? (multiple entries possible)	(Operative) removal
	Leaving/waiting
	Coronectomy
	Referral
	Orthodontic extrusion and subsequently extraction
Are you familiar with the surgical procedure of coronectomy? (one selection)	Yes
	No
Do you consider coronectomy a reliable technique? (one selection)	Yes
	No
Could you imagine carrying out a coronectomy instead of an operative removal involving the risk of an inferior alveolar nerve lesion? (one selection)	Yes
	No
How many coronectomies did you carry out approximately? (one selection)	None
	<5
	5–20
	>20
If you have carried out coronectomies, have you been satisfied with the results? (if yes, one selection)	Yes
	Rather yes
	Rather no
	No
Would you wish for practice-oriented continuing education about coronectomy? (one selection)	Yes
	No

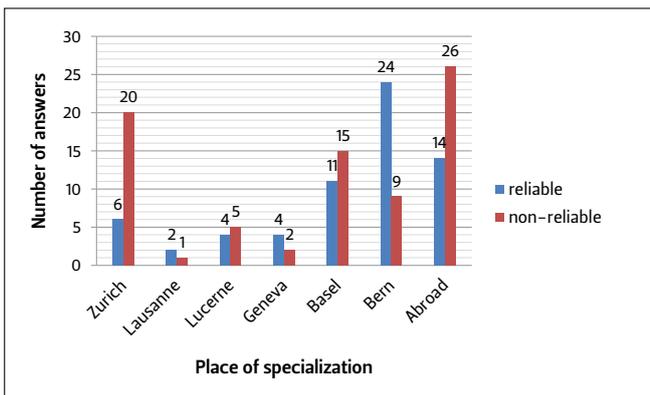


Fig. 4 Assessment of the reliability of coronectomy dependent on the place of specialization (n = 143, no answer = 12)

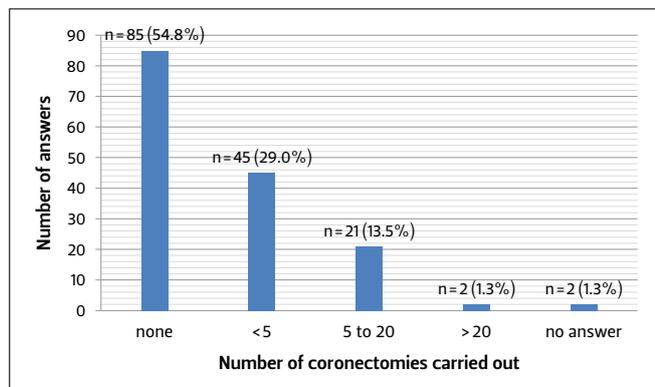


Fig. 5 Number of coronectomies carried out

willing to perform a coronectomy. Thus far the technique had not been applied by 54.8% (n = 85) of the respondents. Less than five coronectomies were carried out by 29.0% (n = 45), five to twenty by 13.5% (n = 21), and more than twenty by 1.3% (n = 2; Fig. 5). Two participants (1.3%) did not provide information. Among interviewees who had performed a coronectomy, 88.6% (n = 62) were “satisfied” or “rather satisfied” with the result. Eight (11.4%) were “rather dissatisfied” or “dissatisfied” with the result. Practice-oriented continuing education on the topic of coronectomy was wished by 47.7% (n = 74).

## Discussion

In Switzerland wisdom teeth associated with a high risk of IANI frequently are removed by maxillofacial surgeons and specialist dentists for oral surgery. Correspondingly, the present survey focused on this target group. Relying on 58.3% returned and evaluated questionnaires the data base can be assumed to be sound.

The survey demonstrated that a little more than half of the specialist physicians and dentists have a critical attitude towards coronectomy. The technique was rated as “non-reliable” by 51.6% of the respondents (Fig. 2). The proportion of specialist physicians and dentists considering coronectomy “reliable” is higher among those who acquired the specialization in or after the year 2005 as compared to those who completed it earlier (until 2005; Fisher’s exact test,  $p < 0.05$ ; Fig. 3). As opposed to the other places of advanced training, a larger proportion of respondents who attained the specialization in Bern considered coronectomy “reliable” (Fisher’s exact test,  $p < 0.05$ ; Fig. 4). Those who already had performed coronectomies, rather than

those who thus far did not implement it, rate the procedure as “reliable” (Fisher’s exact test,  $p < 0.001$ ). In cases at high risk of IANI, 40.6% offered a coronectomy (Fig. 1). Over half of the cohort (54.8%) thus far has not carried out a coronectomy (Fig. 5). The indicated numbers of interventions allow assuming that the technique is not widespread in Switzerland. Particularly remarkable was the great numerical discrepancy between specialist physicians/dentists who could imagine applying the technique in teeth associated with a high risk of IANI (69.0%) and those who actually offered this therapeutic option to the patient (40.6%) or denoted it as “reliable” (41.9%). Possible reasons could be improper knowledge about the indication and/or the technical implementation. This is suggested by the wish for practice-oriented continuing training about coronectomy (47.7%).

A limitation of the present survey could be that knowledge about the definition and proper implementation of a coronectomy was presupposed. With the intention to not influence the answers, this knowledge was not imparted in the accompanying letter and the questionnaire. Therefore it was deliberately asked for the subjective assessment (“reliable”/“non-reliable”). It is debatable whether an unsuccessful attempt to remove a wisdom tooth leaving a part of the root in place is regarded as coronectomy by some surgeons. In such cases this procedure could be abused as scientific legitimization. In contrast, coronectomy is a preoperatively planned approach. The patient is informed about the surgical procedure, the associated risks, and the aftercare. These premises do not exist in cases where root residues are accidentally left in place. The experience of some specialists with accidentally left root residues and the possibly vague definition could have affected the results of the survey. This assumption is supported by a series of personal messages to the co-author. All the senders were experienced maxillofacial surgeons active for a long time in the practice. They were afraid that surgically less adept operating surgeons more likely would tolerate accidental leaving of residual roots and designate the treatment as coronectomy.

According to a survey among members of the British Association of Oral Surgeons (BAOS), coronectomy was offered by 73% of the respondents (DEVINE ET AL. 2017). The prominent difference in acceptance between this cohort and the Swiss colleagues (41%) possibly could be attributed to the early and high-quality publications about this technique in England (O’RIORDAN 1997; RENTON ET AL. 2005). A further reason for the high acceptance of coronectomy in the Anglo-Saxon region could be fear of medico-legal claims, which affects the therapy selection in favor of less risky options. Nevertheless, 93.5% of the respondents in the present survey indicated that the surgical procedure was known and 69.0% could imagine applying the method in “high-risk teeth”. Further studies comparable to our survey were not found in the literature.

Two controlled randomized studies confirm a lower incidence of IANI in the groups treated with coronectomy as opposed to the groups which had undergone an operative removal (LEUNG & CHEUNG 2009; RENTON ET AL. 2005). A newer meta-analysis and systematic review of studies with an observation period of 6–120 months does not reveal a significant difference between the two therapy options regarding infections and postoperative pain (CERVERA-ESPERT ET AL. 2016). IANI constitutes a strong psychosocial burden for the patient (SMITH ET AL. 2013). These outcomes contrast with the results of the present survey and the rather refusing attitude of the Swiss specialist physicians

and dentists. With this work we hope to initiate the discussion about coronectomy, to increase the acceptance, and to bring to mind a suitable alternative in cases of “difficult” wisdom teeth as a potential therapy option for the benefit of the patients.

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## Résumé

La coronectomie est l'extraction partielle, intentionnelle et chirurgicale d'une dent. Il s'agit d'enlever la couronne de la dent en laissant la racine. L'incidence d'une lésion du nerf alvéolaire inférieur (*Nervus alveolaris inferior*) est ainsi réduite par rapport à l'extraction totale des dents de sagesse. L'objectif de cette étude était de réaliser un bilan concernant l'utilisation et la validation de la coronectomie des dents de sagesse en Suisse.

Un questionnaire anonyme a été envoyé à 266 chirurgiens-dentistes ou spécialistes en chirurgie maxillo-faciale. Parmi ces questionnaires, 58,3% ont été retournés et ont pu être intégrés à l'étude. L'analyse statistique a été réalisée au moyen d'un test exact de Fisher. La technique a été qualifiée de «non fiable» par 51,6% des répondants. Ils ont été 40,6% à proposer une coronectomie à leurs patients en cas de risque élevé de lésion du nerf alvéolaire inférieur. Ils ont été 69,0% à pouvoir envisager une coronectomie au lieu d'une extraction chirurgicale pour une dent présentant un risque élevé de lésion du nerf alvéolaire inférieur. La proportion de médecins n'ayant pas pratiqué cette technique est de 54,8%. Celle-ci a été considérée comme «plus fiable» par les spécialistes/dentistes ayant suivi leur spécialité en 2005 ou après ( $p < 0,05$ ), par ceux ayant suivi leur spécialité à Berne ( $p < 0,05$ ), mais aussi par ceux qui avaient déjà eu recours à la coronectomie ( $p < 0,001$ ). En conclusion, on constate que la majorité des spécialistes/dentistes opposent un refus à la coronectomie. Au vu des résultats de l'étude, il conviendra de reconsidérer cette position.

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