치의학석사 학위논문

# 컴퓨터 단층 촬영을 통한 하치조신경 손상 위험성 평가의 효용성

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2013년 2월

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이 논문을 치의학석사 학위논문으로 제출함

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서울대학교 치의학대학원

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**논문제목 : 컴퓨터 단층 촬영을 통한 하치조신경 손상 위험성 평가의 효용성**


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## Abstract

# Efficacy of Computed Tomography Based Evaluation for Risk of Inferior Alveolar Never Damage

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Purpose : The aims of this study were to evaluate the incidence of inferior alveolar nerve (IAN) injury and various risk factors of IAN damage, and to assess the efficacy of CT on the evaluation for risk factors of IAN damage after lower

third molar removal.

Patients and Methods : This study included total 735 patients who underwent surgical procedures for the 3rd molar extraction between January 2000 and August 2009 and total number of teeth was 1058 lower third molars. Among them, 271 teeth were additionally examined by dental computed tomography (CT). The prediction variables for IAN damage such as age, Pederson difficulty index, radiographic risk signs through panoramic view or CT scan were evaluated statistically, and sensitivity, specificity, positive predictive value, and negative predictive value were calculated about each radiographic risk sign.

Results: Total 5 cases (0.5%) out of 1058 lower third molar extraction cases showed symptoms of IAN damage after surgical procedures. Patient age, darkening of root on panoramic radiograph, and contact or intrusion of root into IAN on CT scan may be related with IAN damage after

extraction, but the incidence of IAN damage is too low to verify statistical significance. Pederson difficulty index seems not reliable prediction factors for risk evaluation of IAN injury. The presence of risk sign(s) on CT scan had positive predictive value of 0.4%, and absence of these had a negative predictive value (99.3%).

Conclusion: The incidence of persistent (over 6 months) and temporary (less than 6 months) IAN damage is 0.2%, 0.3% respectively. Although usefulness of CT scan as a positive predictor is limited due to very low incidence of IAN damage, preoperative CT scan seems to be an efficient approach of negative prediction for risks of IAN damage during lower third molar extraction.

Keywords : Inferior Alveolar Nerve, Computed Tomography, Lower Third Molar, Nerve Damage

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# Contents

# Introduction

The removal of lower third molar is one of the most common operations performed at dental clinics and dental hospitals. The surgical procedure of 3rd molar extraction is relatively straight forward, but can lead severe complications including nerve damage to lingual nerve, long buccal nerve and inferior alveolar nerve (IAN) [1-3]. The incidence of IAN damage varies from 1% to 5% for temporary lack of sensation and about 1% for permanent symptoms [4-6].

Anatomic relationship between mandibular canal and the roots of third molar, age, gender, type of anesthesia, experience of surgeon and improper instrumentation contribute to damage to IAN [7-9]. Among them, anatomical intimacy of IAN with roots of 3rd molar is major risk factor for IAN damage [10]. Panoramic radiograph is commonly used to estimate the risk for IAN damage after removal of third molar. There have been a lot of studies about radiographic risk factor [11, 12]. Of them, Rood and Shehab in 1990 introduced seven panoramic risk factors [13].

Panoramic radiograph can be useful tool for predicting risk of nerve damage to IAN after surgical removal of lower third molar, but cannot be utilized to evaluate buccolingual relationship because it is limited by two dimension imaging ability. In contrast, computed tomography (CT) can generate three-dimensional images and allows us to identify exact relationship between IAN and the root of lower third molar. However, the efficacy of CT scan in predicting nerve injury risks of third molar extraction is controversial because the prevalence of IAN injury is very low and CT scan itself may not be useful to reduce the incidence of IAN damage [14, 15].

The purposes of this study were to evaluate the prevalence of IAN injury and various risk factors of IAN damage, and to assess the efficacy of CT scan on the evaluation for risk factors of IAN damage after lower third molar removal.

# Patients and Methods

## Patients

This retrospective clinical study was consisted of 735 patients (409 women and 326 men, aged between 12 and 68 years, average 28.17± 9.61) who were underwent surgical extraction of consecutive 1058 impacted lower third molars (542 left and 516 right teeth) by same surgeon (BM Seo) at the Department of Oral and Maxillofacial Surgery, Seoul National University Dental Hospital, Seoul, Korea, between January 2000 and August 2009. Preoperative panoramic radiography were taken routinely and reformatted CT scan was obtained from 180 patients for 271 teeth (102 women and 78 men, aged between 16 and 60 years, average 27.57±8.21, 151 left and 120 right teeth) (Table 1).

## Surgical technique

The sterile surgical field was prepared before surgery and one side of 3$^{rd}$ molar(s) were surgically removed under local anesthesia. Sometimes, both sides of 3$^{rd}$ molars were removed at the same time under general

anesthesia or deep sedation. Mucoperiosteal flap was raised to expose the part of impacted 3rd molar, and lingual flap was retracted with Molt curette if needed. High speed rotary instrument (#3 surgical round bur) was utilized for the removal of covering alveolar bone and odontectomy for the 3rd molar. The surgical wound was closed with 4-0 vicryl after thorough sterile saline irrigation for cleaning the extraction socket. Antibiotics and analgesics were routinely prescribed (typically amoxicilline clavulinated 625 mg and acetaminophen 650 mg t.i.d. for 5 days and 0.1% chlorhexidine gargle solution for 3 times a day for 3 days). A week later, stitches were removed at the outpatient department.

### Study variables

The age of patients was retrieved from patients' data, to identify any correlation between age and frequency of IAN damage following lower third molar removal (dividing under 30 year-old group and 30 or more year-old group).

Second variable was the difficulty index for removal of impacted lower third molars, proposed by Pederson [16] (Table 2). The difficulty index

can be calculated by adding values of each radiographic finding about impacted third molar: angulation, depth, and ramus relationship/space available. Angulation was classified as: mesioangular, horizontal or transverse, vertical, distoangular. Depth was divided as: level A, high occlusal level; level B, medium occlusal level; or level C, deep occlusal level. Ramus relationship/Space available was defined as: class I, sufficient space; class II, reduced space; class III, no space at all.

A 3rd variable was presence or absence of seven panoramic risk factors which was introduced by Rood and Shehab (1990): darkening of the root, deflected roots, narrowing of the root, dark and bifid roots, interruption of the white line, diversion of the inferior alveolar canal, narrowing of the inferior alveolar canal [17] (Figure 1). The findings on CT scans show the spatial relationship between IAN and the root of lower third molar more accurately. According to buccolingual position on CT scans, mandibular canal position was classified as: buccal, lingual, inferior and interradicular. Spatial relationship between IAN and root was further divided as: separated, contacted and intruded.

Outcome variables were presence or absence of IAN, lingual nerve and long buccal nerve damage after surgical removal of lower third molar,

which were retrieved from dental record of patients.

### Data analysis

Appropriate descriptive statistics were computed and bivariate analyses were carried out to assess the relationship among study variables. The sensitivity, specificity, and positive and negative predictive values were computed for each radiographic risk factor.

# Results

## The incidence of nerve damage

The study sample was composed of 1058 lower third molars surgically extracted by same surgeon, which 5 (0.5%) cases showed sensory deficit of IAN (Table 3). Three (0.3%) cases of IAN damage recovered within 6 months, remaining 2 (0.2%) cases failed to recover completely over 6 months. The lingual nerve and long buccal nerve deficit were showed in 5 cases (0.5%) and 2 cases (0.2%) respectively. Sensory diminution was transient in all long buccal nerve cases, but only 3 cases of lingual nerve recovered completely.

## Age

There were 750 extraction cases (70.9%) in under 30 year-old group, among them two cases showed IAN deficit; a case was temporary (0.1%), a case was persistent (0.1%), 748 cases were no IAN symptoms (99.7%). In older group, total case were 308 (29.1%), 2 were temporary IAN damage (0.6%), 1 was permanent IAN damage (0.3%), 305 were no IAN symptoms (99.0%) (Table 4).

### Pederson difficulty index for removal of impacted lower third molars

The difficulty index for removal of impacted lower third molar was calculated by adding values of each classification (Table 2). Among 1058 lower third molar provided in this study, 161 were ‘very difficult’ (15.2%), 657 were ‘moderately difficult’ (62.1%), 240 were ‘minimally difficult’ (22.7%). Similar distribution was found on CT taking group (271 cases); 48 were ‘very difficult’ (17.7%), 150 were ‘moderately difficult’ (55.4%), 73 were ‘minimally difficult’ (26.9%) (Table 5).

Four (80.0%) of five cases which had neurological symptoms on IAN belonged to ‘very difficult’ or ‘moderately difficult’. In ‘very difficult’ group, one case of persistent IAN damage was found. In ‘moderately difficult’ group, 2 were temporary, one was permanent. In ‘minimally difficult’ group, only one temporary IAN deficit was found without any persistent symptom. The difficulty index, however, was found to be not statistically associated with IAN damage on Fisher’s exact test (Table 6). The Pederson difficult index and CT scan images showed weak relationship between surgical difficulty index and anatomic intimacy between mandibular canal and the root of lower third molar (Table 7).

### Panoramic radiographic risk factors

The frequency of the panoramic radiographic risk factors out of 1058 lower third molars were: 1) darkening of the root, n=152 (14.4%), 2) deflected roots, n=74 (7.0%), 3) narrowing of the root, n=195 (18.4%) 4) dark and bifid root, n=284 (26.8%), 5) interruption of the white line, n=379 (35.8%), 6) diversion of the inferior alveolar canal, n=95 (9.0%), 7) narrowing of the inferior alveolar canal, n=303 (28.6%). 447 cases had no panoramic radiographic risk factors. In the patients had taken CT scans or had IAN damage, the rates of each panoramic radiographic risk factor were much higher (Table 8). The frequency of higher number of panoramic radiographic risk factors was generally increased in CT scan group than non-CT scan group (Table 9).

### Spatial relationship of mandibular canal with 3$^{rd}$ molar on CT scan

Of 271 lower third molars, 67 cases (24.7%) were identified as separated, 103 (38.0%) contacted and 101(37.3%) intruded with mandibular canal on CT scan. Inferior position of IAN to 3$^{rd}$ molar was most frequently found (n=178, 65.7%). Interestingly, lingual position of IAN was only observed at risky position (contacted, intruded) (Table 10).

IAN damage occurred more in cases of high risk on CT scan, including intruded and contacted. No tooth had IAN deficit over 6 months in low risk group on CT scan. In diagnostic ability of CT scan for prediction; the sensitivity was 66.7%, the specificity was 24.5%. Positive predictive value was 0.4%, negative predictive value was 99.3% assuming a 0.5% rate of IAN damage. The incidence of IAN damage after third molar removal among the patients who had CT scans was 1.1%.

# Discussion

The lower third molar extraction is one of the most frequently performed operations at dental clinics or dental hospitals. This surgical procedure is sometimes accompanied by nerve damages to inferior alveolar nerve (IAN), lingual nerve, and long buccal nerve. The incidence of IAN damage in this study is 0.5% as a total and reduced to 0.2% for the persistent neurologic deficit. This result is quite low comparing other studies which reported the incident rate varies from 1% to 5% for temporary lack of sensation and about 1% for permanent symptoms [4-6]. Although various contributing factors, including age, gender, type of anesthesia, experience of surgeon, level of impaction and the anatomic relationship between mandibular canal and the root of lower third molar, have been reported previously[3, 7-9, 18], in present study, IAN damage occurred only 5 cases (0.5%). The number of damage cases was quite low, therefore reliable statistical significant conclusion could not be draw by this study. In Valmaseda-Castellon's study, the IAN injury rate increased significantly with patient age, and patients with permanent lesion were significantly older than those who recovered [5]. Patient age has been

reported to increase the risk of IAN damage in the presence of other preoperative risk factors such as the anatomic relation between the roots of lower third molar and the mandibular canal. Kim et al. reported that the prevalence of IAN injury has been shown to be greater with increasing age [19]. In present study, patient age seems to be associated with IAN injury following third molar removal. Although the rate of IAN damage in the older group was three times more than the younger group, the statistical significance cannot be definitely determined due to lack of cases.

The difficulty of third molar extraction could be evaluated radiographically through several factors. Pederson difficulty index for the surgical extraction of impacted third molars was one of them [16]. Jerjes reported that spatial relationship (distoangular and horizontal), ramus/space (class III), depth of impaction (depth C) were highly significant in predicting the incidence of nerve damage after third molar removal [20]. In present study, the difficulty index had independent values, regardless of anatomic intimacy. The numerical value of Pederson difficulty index seemed not associated with IAN damage or CT grading. Although it is not fully acceptable as a reliable

predictor, it is noticeable that there was no permanent IAN damage with minimal difficulty in Pederson index.

The panoramic radiography is the most widely used to evaluate the risk for IAN damage. Rood and Shehab have suggested seven panoramic radiographic risk factors, and reported that three factors such as diversion of canal, darkening of root, interruption of white line are associated with IAN damage [17]. In Sedaghatfar et al. showed that significant panoramic risk factors were darkening of root, narrowing or root, interruption of white line, diversion of canal [21] . In present study, only darkening of root as risk factor seems to be statistically associated with IAN damage. Similar to the previous studies, the positive predictive value (PPV) was 0.021 for darkening of root, assuming a 0.5% incidence of IAN injury (Table 12).

Computed tomography is a reliable diagnostic tool to determine the exact relationship between IAN and lower third molar. However, the efficacy of CT scan about prediction for nerve damages after lower third molar extractions is equivocal because the incidence of IAN injury is very low in spite of its expensive cost. Sanmarti-Garcia et al. have reported that CT does not seem to significantly decrease the risk

of IAN injury through retrospective cohort study of 150 lower third molar extractions [14] . In this study, the prevalence of IAN damage in patients with CT scan was 1.1%, rather higher in comparision with 0.5% incidence as a total. This may result from the fact that only high risk patients take a CT scan. Jhamb et al. have reported that the CT scans enhanced the visualization of the relation of IAN to third molar, which might provide safety of both the surgeon and the patient [22]. Statistically association between CT based evaluation and IAN injury cannot be obtained because the frequency was very low. However, in the absence of high risk findings on CT scans, there were no patients who had prolonged IAN symptoms over 6 months. It definitely showed that computed tomography scan had the benefit of prediction for risk of IAN damage before lower third molar removal. Collectively, the CT scan may not be useful to reduce the incidence of IAN damage, but can be utilized as a tool for rule out high risk patients for a prophylactic indication.

# Conclusion

This study was carried out to estimate the incidence of IAN injury, to evaluate risk factors of IAN damage and to assess the efficacy of CT based evaluation for risks of IAN damage after lower third molar removal. The conclusion was as follows.

- The rate of IAN damage following removal or lower third molar is 0.5%. Among them, sensory disturbance was disappeared in 6 months on 0.3% and persistent neurologic deficit remained 0.2% over 6 months.
- The presence of risk sign(s) on CT scan had positive predictive value of 0.4%. Absence of these risk signs on CT scan had a strong negative (99.3%) predictive value. CT scan can be an effective diagnostic approach as negative predictor for risk of IAN damage following mandibular third molar extraction.

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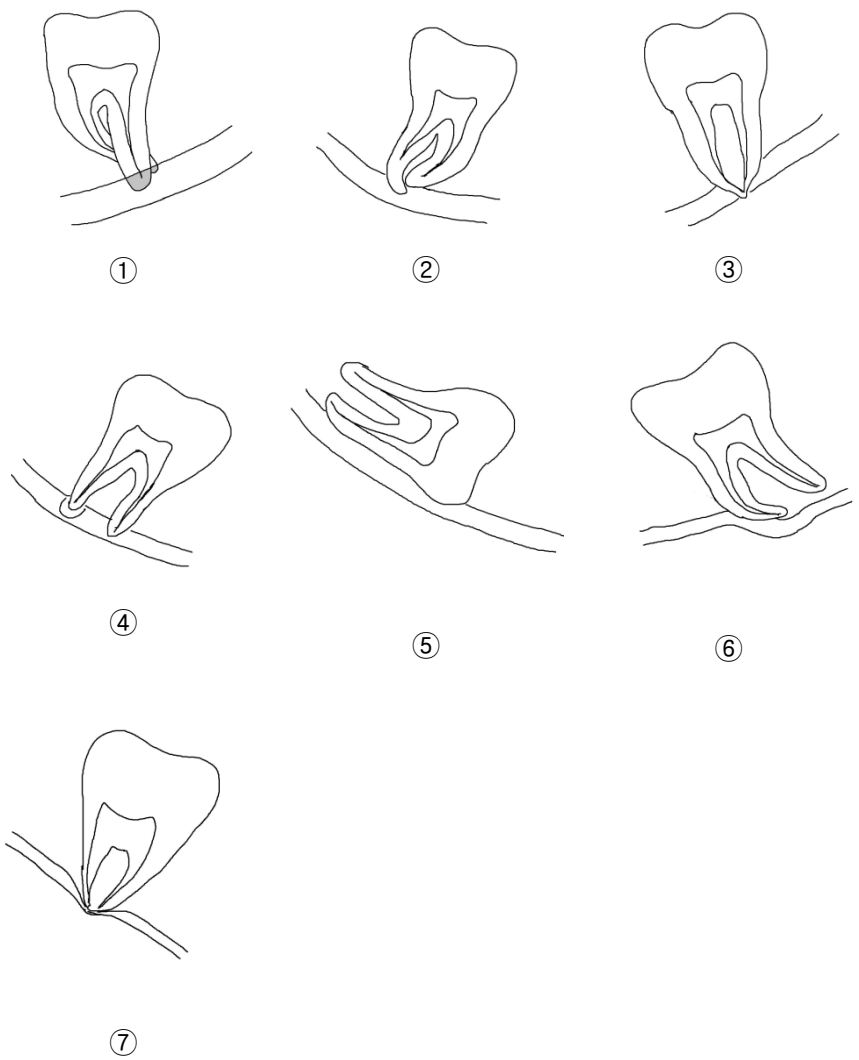
**Table 1.** Characteristics of patients

| Characteristic | | Total patients | | CT taking patients | |
|---|---|---|---|---|---|
| Age | | | | | |
| | Mean | 28.17±9.61 | | 27.57±8.21 | |
| | Range | 12 - 68 | | 16 - 60 | |
| Gender | | | | | |
| | Male | 326 | 44.4% | 78 | 43.3% |
| | Female | 409 | 55.6% | 102 | 56.7% |
| | Total | 735 | 100.0% | 180 | 100.0% |
| Lower 3rd molar | | | | | |
| | Left | 542 | 51.2% | 151 | 55.7% |
| | Right | 516 | 48.8% | 120 | 44.3% |
| | Total | 1058 | 100.0% | 271 | 100.0% |

**Table 2**. Difficulty index of impacted lower third molars on panoramic radiographs (by Pederson )

| Classification | | Value |
|---|---|---|
| Angulation | | |
| | Mesioangular | 1 |
| | Horizontal/Transverse | 2 |
| | Vertical | 3 |
| | Distoangular | 4 |
| Depth | | |
| | Level A | 1 |
| | Level B | 2 |
| | Level C | 3 |
| Ramus relationship/Space available | | |
| | Class Ⅰ | 1 |
| | Class Ⅱ | 2 |
| | Class Ⅲ | 3 |
| Difficulty Index | | |
| | Very difficult | 7~10 |
| | Moderately difficult | 5~7 |
| | Minimally difficult | 3~4 |

**Figure 1.** Seven panoramic radiographic risk factors of IAN damage




1) darkening of the root, 2) deflected roots, 3) narrowing of the root, 4) dark and bifid root, 5) interruption of the white line, 6) diversion of the inferior alveolar canal, 7) narrowing of the inferior alveolar canal.

**Table 3.** The frequency of nerve damages after extraction of lower third molar

| Neurological symptom | Temporary (<6 months) | Permanent (>6 months) | Total (%) |
|---|---|---|---|
| No symptom | | | 1046 (98.8%) |
| IAN damage | 3 (0.3%) | 2 (0.2%) | 5 (0.5%) |
| LN damage | 3 (0.3%) | 2 (0.2%) | 5 (0.5%) |
| BN damage | 2 (0.2%) | 0 (0.0%) | 2 (0.2%) |
| Total | | | 1058 0.0%) |

* IAN: inferior alveolar nerve
* LN: lingual nerve
* BN: long buccal nerve

**Table 4.** The age of patients and IAN damage

| Age | IAN damage | | | No symptom | Total |
|---|---|---|---|---|---|
| | Temporary (<6 months) | Permanent (>6 months) | Total | | |
| under 30 | 1 (0.1%) | 1 (0.1%) | 2(0.3%) | 748 (99.7%) | 750 (70.9%) |
| 30 or more | 2 (0.6%) | 1 (0.3%) | 3(1.0%) | 305 (99.0%) | 308 (29.1%) |

* p value < .05

* IAN: inferior alveolar nerve

**Table 5.** Distribution of impaction types and difficulty index

| Classification | Total patients | | CT taking patients | |
|---|---|---|---|---|
| **Angulation** | | | | |
| Mesioangular | 428 | 40.5% | 128 | 47.2% |
| Horizontal | 374 | 35.3% | 86 | 31.7% |
| Transverse | 8 | 0.8% | 5 | 1.8% |
| Vertical | 235 | 22.2% | 52 | 19.2% |
| Distoangular | 13 | 1.2% | 0 | 0.0% |
| **Depth** | | | | |
| Level A | 508 | 48.0% | 107 | 39.5% |
| Level B | 468 | 44.2% | 133 | 49.1% |
| Level C | 82 | 7.8% | 31 | 11.4% |
| **Ramus relationship/Space available** | | | | |
| Class Ⅰ | 382 | 36.1% | 97 | 35.8% |
| Class Ⅱ | 420 | 39.7% | 118 | 43.5% |
| Class Ⅲ | 256 | 24.2% | 56 | 20.7% |
| **Difficulty Index** | | | | |
| Very difficult | 161 | 15.2% | 48 | 17.7% |
| Moderately difficult | 657 | 62.1% | 150 | 55.4% |
| Minimally difficult | 240 | 22.7% | 73 | 26.9% |

**Table 6.** Difficulty index on panoramic radiographs and IAN damage

| Difficulty index | IAN damage | | |
|---|---|---|---|
| | Temporary (<6 months) | Persistent (>6 months) | Total |
| Very difficult | 0 (0.0%) | 1 (50.0%) | 1 (20.0%) |
| Moderately difficult | 2 (66.7%) | 1 (50.0%) | 3 (60.0%) |
| Minimally difficult | 1 (33.3%) | 0 (0.0%) | 1 (20.0%) |

* p value > .05 ; this result is not statistically associated.

* IAN: inferior alveolar nerve

**Table 7.** Difficulty index and the relationship between IAN and lower third molar

| Difficulty index | on CT view | | Total |
|---|---|---|---|
| | High risk | Low risk | |
| Very difficult | 43 (89.6%) | 5 (10.4%) | 48 (100.0%) |
| Moderately difficult | 108 (72.0%) | 42 (28.0%) | 150 (100.0%) |
| Minimally difficult | 53 (72.6%) | 20 (27.4%) | 73 (100.0%) |

* High risk : intruded or contacted , Low risk : separated

**Table 8.** The frequency of panoramic radiographic risk factors

| | Total patients | | CT taking | | IAN damage | |
|---|---|---|---|---|---|---|
| Panoramic radiographic risk factors | | | | | | |
| Diversion of canal | 95 | 9.0% | 31 | 11.4% | 1 | 20.0% |
| Narrowing of canal | 303 | 28.6% | 126 | 46.5% | 2 | 40.0% |
| Dark and bifid root | 284 | 26.8% | 125 | 46.1% | 3 | 60.0% |
| Narrowing of root | 195 | 18.4% | 86 | 31.7% | 2 | 40.0% |
| Darkening of root | 152 | 14.4% | 109 | 40.2% | 3 | 60.0% |
| Deflected root | 74 | 7.0% | 46 | 17.0% | 0 | 0.0% |
| Interruption of the white line | 379 | 35.8% | 130 | 48.0% | 4 | 80.0% |
| No radiographic signs | 447 | 42.2% | 22 | 8.1% | 1 | 20.0% |

* IAN: inferior alveolar nerve

* Each parameter was overlapping counted.

**Table 9.** The numbers of panoramic risk factors

| Number | no CT taking | | CT taking | |
|---|---|---|---|---|
| 0 | 425 | 54.0% | 22 | 8.1% |
| 1 | 89 | 11.3% | 40 | 14.8% |
| 2 | 128 | 16.3% | 77 | 28.4% |
| 3 | 106 | 13.5% | 80 | 29.5% |
| 4 | 29 | 3.7% | 42 | 15.5% |
| 5 | 10 | 1.3% | 9 | 3.3% |
| 6 | 0 | 0.0% | 1 | 0.4% |
| 7 | 0 | 0.0% | 0 | 0.0% |
| Total | 787 | 100.0% | 271 | 100.0% |

(p value < .05)

**Table 10.** The spatial relationship between mandibular canal and third molar on computed tomography (CT)

| Position of IAN | Buccal | | Lingual | | Inferior | | Interradicular | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|
| Separated | 26 | 38.8% | 0 | 0.0% | 41 | 61.2% | 0 | 0.0% | 67 | 24.7% |
| Contacted | 26 | 25.2% | 9 | 8.7% | 66 | 64.1% | 2 | 1.9% | 103 | 38.0% |
| Intruded | 8 | 7.9% | 17 | 16.8% | 71 | 70.3% | 5 | 5.0% | 101 | 37.3% |
| Total | 60 | 22.1% | 26 | 9.6% | 178 | 65.7% | 7 | 2.6% | 271 | 100% |

* IAN: inferior alveolar nerve

**Table 11.** Classification through CT scan and IAN damage

| | | | IAN damage | | |
|---|---|---|---|---|---|
| | | | Temporary (<6 months) | Persistent (>6 months) | Negative |
| CT taking | High risk | Intruded | 0 | 1 | 100 |
| | | Contacted | 1 | 0 | 102 |
| | Low risk | Separated | 1 | 0 | 66 |
| | Total | | 2 | 1 | 268 |
| No CT taking | | | 1 | 1 | 785 |
| Total | | | 3 | 2 | 1053 |

* sensitivity = 66.7% , specificity = 24.5%

* positive predictive value = 0.4% , negative predictive value = 99.3%

* incidence of IAN damage in CT taking patients = 1.1%

* IAN: inferior alveolar nerve

**Table 12.** Estimates of sensitivity, specificity, and PPV and NPV

| Radiographic risk factors | sensitivity (%) | specificity (%) | PPV(%) | NPV(%) | P value |
|---|---|---|---|---|---|
| Diversion of canal | 20.0% | 91.1% | 1.1% | 99.6% | 0.376 |
| Narrowing of canal | 40.0% | 71.4% | 0.7% | 99.6% | 0.628 |
| Dark and bifid root | 60.0% | 73.3% | 1.1% | 99.7% | 0.123 |
| Interruption of white line | 80.0% | 64.4% | 1.1% | 99.8% | 0.058 |
| Narrowing of root | 40.0% | 81.7% | 1.1% | 99.6% | 0.231 |
| Darkening of root | 60.0% | 85.9% | 2.1% | 99.8% | 0.023 |
| Deflected root | 0.0% | 93.0% | 0.0% | 99.5% | 1 |

* PPV: positive predictive value, NPV: negative predictive value

* p value was based on Fisher's exact test.

## 초록

# 컴퓨터 단층 촬영을 통한 하치조신경 손상 위험성 평가의 효용성

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목적: 본 연구의 목적은 하악 제3 대구치 발치 후 발생할 수 있는 하치조신경 손상의 유병율과 다양한 위험요인들을 평가하며, 이러한 하치조신경 손상의 위험요인들을 평가하는데 컴퓨터 단층촬영이 유용한지 확인하는 것이다.

대상 및 방법: 표본은 2000년 1월1일부터 2009년 8월 31까지 서울대학교 치과병원의 동일 술자에 의해 하악 제3 대구치 발치를 시행한 735명의 환자(1058개의 치아)들을 대상으로 하였다. 모든 치아들은 술전 파노라마 방사선촬영을 시행하였으며, 그 중 컴퓨터 단층촬영을 추가로 시행한 치

아는 273개였다. 하악 제3 지치 발치 후 하치조신경 손상에 영향을 주는 위험요인들 중 환자의 나이, 매복 지치에 대한 Pederson의 발치 난이도 지수, 파노라마 방사선 영상에 나타난 위험 징후, 컴퓨터 단층촬영으로 평가한 신경과 제3대구치 치근의 해부학적 관계들을 통계적으로 평가하였고, 각 방사선학적 위험 징후들에 관하여 민감도, 특이도, 양성예측도, 음성예측도를 분석하였다.

결과: 총 1058개 중 5례(0.5%)의 증례에서 하악 지치 발치 후 하치조신경 손상의 징후들이 나타났다. 환자의 나이, 파노라마 사진상의 치근부 암영, 컴퓨터 단층촬영을 통해 평가한 치근과 하치조관에 대한 접촉이나 함입의 위치관계들이 발치 후 신경 손상과 관련이 있는 것으로 나타났지만, 신경 손상의 발생빈도가 너무 낮아서 통계적인 유의성을 부여하기는 어렵다. 파노라마 방서선 영상을 기초로 한 Pederson 난이도 지수는 하치조신경 손상의 위험을 평가하는데 있어 신뢰성 있는 지표가 아닌 것으로 보인다. 컴퓨터 단층촬영을 통하여 평가한 위험 징후는 0.4%의 양성예측도를 보였으며, 음성예측도는 99.3%의 값을 나타냈다.

결론: 본 연구에서 하악 제3대구치 발치 후 나타나는 하치조신경 손상은 6개월 이상 지속되는 경우가 0.3%, 6개월 이내 회복되는 경우가 0.2% 발

생한 것으로 나타났다. 하치조신경 손상이 낮은 빈도로 발생하므로 이에 대한 컴퓨터 단층촬영의 양성예측도 평가는 한계를 보이지만, 음성예측도 평가는 유효한 방법으로 보인다.

**주요어 : 하치조신경, 컴퓨터 단층촬영, 하악 제3대구치, 신경 손상**

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