



Prevention and Management of Inferior Alveolar Nerve Injury Caused by Mandibular Third Molar Removal

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Short Communication

The constituent ratio of reasons of the tooth extraction

Tooth extraction, as the ultimate dental treatment mostly, is a commonest surgical procedure carried out by the oral surgeon. Reasons for tooth extraction vary with the dental treatment and dental habit, education condition, economic level and so on [1,2]. Through the statistical analysis of the reasons for tooth extraction, it is helpful to know the oral health condition and the medical condition of oral cavity, and treatment of oral diseases.

From the 1950s till now, investigation of the reasons for tooth extraction have been performed in many countries or areas [1,3]. But most of these surveys were carried after 1980s. In the 1980 s, most studies showed that caries is the leading cause of tooth extraction. In France, Cahen et al. [4] investigated 14,621 cases of tooth extraction. They found that the main reason for the tooth extraction was caries, and the second was periodontitis. At the same period, Ainamo et al. [5] in Finland, Kay [6] and Agerholm [7] in the United Kingdom also investigated tooth extraction reasons. The results showed that the first two reasons were caries and periodontitis. In 1990s, Murray [8] in Canada, Reich [9] in Germany, Haddad [10] in Jordan investigated the reasons of tooth extraction. They reported periodontitis had become the first reason instead of caries. In 21st century, some follow-up studies had shown that the reason spectrum of tooth extraction had been changed [11]. Trovik et al. [12] tracked for 30 years in Norway, The result was that ratio of caries had been decreased significantly. Orthodontic tooth extraction became the main reason for the people under 20 years old. There were also these kinds of studies in China. In 1956 and 1992, two studies were done by Liu [13] and Wang [14] in Peking University, Hospital of Stomatology. Caries and periodontitis alternated leading position. In another famous Chinese dental hospital, West China Stomatological Hospital, Tian got the same result in 1995 from 23040 cases [15].

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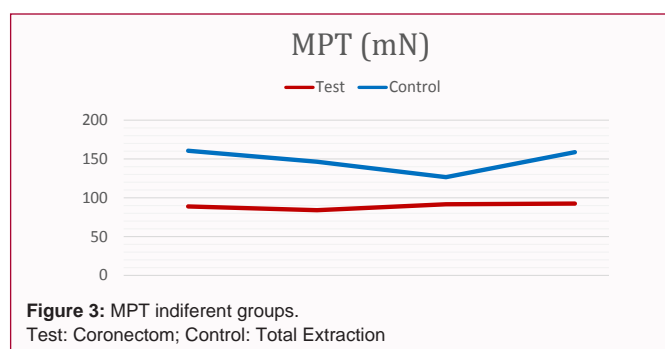
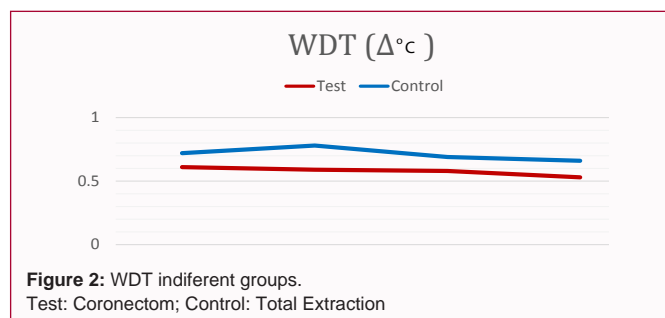
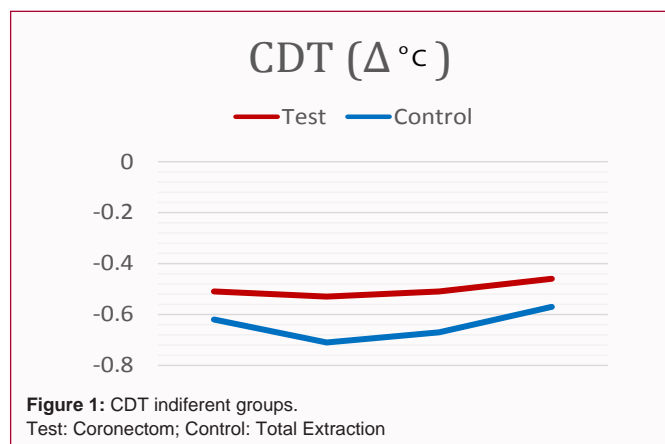
From July 2014 to August 2016, we investigated 26760 teeth extracted from 22796 patients in Peking University, Hospital of Stomatology. 11309 of them were cause by impaction, 6585 were caries, 4661 were periodontitis and 1576 were orthodontic purpose. In general hospital at the same time, 589 from 1107 teeth were extracted because of impaction, 290/1107 was caries and 121/1107 was periodontitis. These indicated that impacted teeth might become the first reason in the central cities of China.

The occurrence and evaluation of the injury of inferior alveolar nerve (IAN)

The treatment of injury of IAN became more and more important with the increase proportion of the mandibular wisdom tooth extraction. There are many factors that affect nerve injury. Operation procedure, age, shape and depth of the root might be the main factors [16].

Once the nerve injury was happened, the types and degree of nerve injury should be evaluated firstly. As the IAN injury is a kind of peripheral nerve injury, it could be follow the injury classification for peripheral nerve. Such as Seddon Classification: neurapraxia, axonotmesis and neurotmesis [17]; Sunderland Classification: I°-V° [18]; British Medical Research Council neurological dysfunction criteria: S0-S4 [19].

Common evaluation methods of IAN injury were subjective evaluation method [20,21], objective examination method and combination of both subjective and objective [20,21]. One of the especially put forward methods is quantitative sensory testing (QST). It's a quantitative input and output psychophysiological method to evaluate the reaction of human subject caused by variety of quantitative stimuli acted on tissues [24]. German Research Network on Neuropathic Pain (DFNS) suggested a standard program of QST depended on related study results [25,26]. After that, Matos raised a series method of QST for trigeminus.



During 2015, we used QST to evaluate 40 patients who had their mandibular third molar removed in our department. The QST were taken in the point of pre-operation, 24 hr, one week and 4 weeks after operation. The results showed that although all the patients had not realized the numbness of lower lip, QST could detect the abnormal of trigeminus. There were significant changes in cold detection threshold (CDT), warmth detection threshold (WDT), heat pain threshold (HPT), mechanical pain threshold (MPT), vibration detection threshold (VDT) and pressure pain threshold (PPT). Alteration trends were decrease of thermal detection ability, bluntness of vibration detection ability and sensitive of pressure pain.

The effect of coronectomy in prevention of IAN injury during the extraction of mandibular third molar

There were some treatment for the IAN injury, such as neuroorrhaphy (epineurial suturing, Beam suture method) [28,29]; autologous nerve transplantation [28,29]; tubulization [30]. And some non-operative methods: laser treatment [28], taking medicine. But the therapeutic effect was unpredictable. That mean to prevent is more important compare with treatment.

Coronectomy is to remove the crown of the wisdom tooth only instead of extract the whole tooth from the mandible. It was firstly

reported by Ecuyer and Debieen in 1984 [31]. In 1989, Knutsson preceded a prospective experimental study of 33 patients. They drew a conclusion that coronectomy was a suitable method in the situation of close contact between root and IAN [32]. After that, some clinical experiments to study the indication and contradiction of coronectomy [33,34]. A 10-year follow-up study showed that there was no untoward effect during the research. A RCT study reported safety and different kinds of movements of the residual roots without any pain and infection.

We design a Prospective controlled study of using QST to detect the neural function of coronectomy compared with total extraction. Preliminary results showed that less influence was happened in coronectomy group. CDT, WDT and MPT were more smoothly in this group in the figure of compare (Figure 1-3). Three move mode scan be seen in CBCT of residual roots after 6 months follow-up: stable motionless, straight motion and mesial rotation. Further follow-up will be taken to find the speed of movement.

Summary, with the development of economy and the change of population, the constituent ratio of tooth extraction was alternated in central city in China. The IAN injury was still an intractable complication. QST is sensitive method to detect the IAN injury after removal of mandibular third molar. It was also useful in the study of coronectomy. The result showed that coronectomy can prevent the injury of IAN, the function of IAN was more stable. The movement of residual root could be straight or curve. The long-term outcome need be continuous follow-up.

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