

CENTRAL AND PERIPHERAL NERVOUS COMPLICATIONS OF DENTAL TREATMENT

EVA OLOVSSON ROSSITTI*

SUUMARY - This review outlines the complications involving the central or peripheral nervous system arising from dental procedures reported in the last decade. By far the commonest complications were related to intraoperative mechanical peripheral nerve injury. Trauma to branches of the mandibular nerve occurring during oral operations may potentially result in varying degrees of hypoesthesia, paresthesia, dysesthesia or in chronic pain syndromes. An increase in malpractice suits related to such a complication has been recognized in the late years. A warning of the possibility of occurrence of this complication should be given to all patients undergoing risky procedures as part of the process of obtaining informed consent to operation. Mandibular third molar extraction seems to be alone the most hazardous procedure related to mechanical nerve injuries and also with anesthesiological accidents. Severe but rather infrequent infectious (meningitis, brain abscess and cavernous sinus thrombophlebitis) and anesthesiological complications (ocular and facial palsies, optic nerve injury and complications related to general anesthesia) were also reported in this period.

KEY WORDS: anesthesia, dental, adverse effects; dental, complications; dentistry, operative; inferior alveolar nerve, injury; lingual nerve, injury; nerve block, adverse effects; sensation disorders, etiology; third molar; tooth extraction, adverse effects.

Complicações de tratamento dentário afetando o sistema nervoso

RESUMO - Complicações, ou eventos inesperados e indesejáveis associados a terapia de uma dada condição, podem ser particularmente incapacitantes quando afetam o sistema nervoso. A proximidade de cavidade craniana e a rica inervação dos tecidos orais representam risco potencialmente alto de disseminação de infecções para o sistema nervoso central e de lesões de troncos nervosos em procedimentos dentários. Em vista do aumento da ocorrência de processos para compensação financeira após tais complicações, é provável que parcela considerável desses pacientes venham a ser examinados por neurologistas. As complicações de tratamento dentário afetando o sistema nervoso central e periférico referidas na literatura (1982-1994) são tema desta revisão. As complicações mais comuns foram as lesões dos ramos da divisão mandibular do nervo trigêmeo provocadas por trauma mecânico. A extração do terceiro molar mandibular foi o procedimento dentário com maior morbidade tanto com relação a trauma mecânico quanto a acidente anestésico. Nesse procedimento o nervo lingual pode ser traumatizado em 11% a 15% das operações e o nervo alveolar inferior em 4,4% a 5,5%. Os sintomas são permanentes em 0,5% a 1,0%. Outras complicações potencialmente severas porém infrequentes no período estudado foram as infecções (meningite, tromboflebite do seio cavernoso e abscesso cerebral) e as complicações anestésicas (oftalmoplegia, paralisia facial e complicações da anestesia geral).

PALAVRAS-CHAVE: anestesia dental, complicações; bloqueio nervoso, complicações; cirurgia bucomaxilofacial; dor facial, etiologia; extração dental, complicações; nervo alveolar inferior; nervo lingual; terceiro molar.

*Dentist. Aceite: 4-janeiro-1995.

Complications are unexpected and undesirable events associated with management of disease conditions. Complications are particularly disabling when they involve the nervous system. In Operative Dentistry, the vicinity to the cranial cavity and the abundance of nerve branches in the oral structures represent definite risks of spreading of infection to the former and of immediate injury to the latter.

The objective of this paper is to outline the complications involving the central or peripheral nervous system that may arise from dental procedures in the current practice.

METHODS AND RESULTS

A search was done in the literature concerning the complications of dental treatment. The sources were MEDLINE and Science Citation Index from 1982 to September 1994, and Current Contents for the last eight weeks.

The articles in regard to complications involving the nervous system were selected. Such reports are summarized in Table 1.

Table 1. Central and peripheral nervous complications of dental treatment.

Complication	Remarks	References
Meningitis	Dental extraction	9,12,19,29
Meningococemia	Dental extraction	24
Orbital cellulitis and meningitis	Dental extraction	3
Cavernous sinus thrombophlebitis	Dental extraction	33
Brain abscess	Dental extraction	22
Amaurosis	Inferior dental nerve block	31
Mechanical nerve injury (lingual or inferior alveolar nerve)	Extraction of the mandibular third molar	2,6,7,8,16,18,20,21,23,26,28,30,32
	Mandibular ramus sagittal split osteotomy 14 and fixation	
Altered sensation (nonspecific)	Mandibular implant surgery	11
Altered sensation (mental nerve territory)	Over-extension of root canal filling	13
Bell's palsy	Occurring twice within 24 hours after dental treatment	27
Peripheral facial nerve paralysis	Upper dental nerve block	1,20
Ocular palsy	Inferior dental nerve block	10,15
Combined peripheral facial nerve and ocular palsy	Inferior dental nerve block	4
Rhabdomyolysis (fatal)	Anesthetical complication	5

COMMENTS

1. Complications affecting the central nervous system

1.1 Infections. Dental procedures are frequently followed by bacteremia, implying a potential risk for infective endocarditis and for other kinds of blood-borne spreading. Bacteria obtained in blood cultures following dental manipulation are similar to the bacteria present in the normal mouth flora, for instance oral streptococci. Infectious complications in the nervous system such as meningitis^{3,9,12,19,24,29}, brain abscess²², cavernous sinus thrombophlebitis³³ and orbital cellulitis³ are presently uncommon due to the preventive use of antibiotics in high-risk procedures.

1.2. Optic nerve injury. Amaurosis was reported in a young patient as a result of local anesthesia by mandibular nerve block³¹. The mechanism of injury was presumably intravascular injection of

local anesthetics. Loss of vision was ipsilateral to the block and the patient presented with subsequent atrophy of the optic nerve.

2. Peripheral nerve injuries

2.1. Related to local nerve block. The occurrence of ocular palsy^{10,15} is presumably related to arterial puncture and intra-arterial injection of local anesthetics. Peripheral facial nerve paralysis is known to occur after local dental block. Most of the patients with this complication develop prosopoplegia immediately after dental anesthesia and resolve completely within 12 hours. Transient prosopoplegia is as a rule related to inferior dental block. The uncommon development of peripheral facial nerve paralysis after upper dental block has been reported¹. A patient was reported to present both facial and oculomotor nerve palsies during the same procedure⁴. Bell's palsy was reported to occur twice in the same patient within 24 hours of a dental treatment, two years apart²⁷; this observation is intriguing, but its casual relation to the dental treatment is merely speculative.

2.2. Mechanical injuries. Trauma to branches of the mandibular nerve may occur during oral operation and it may potentially result in varying degrees of hypoesthesia, paresthesia, dysesthesia or in chronic pain syndromes. Injury of the inferior alveolar and lingual nerves occur mostly in relation to third molar extraction^{2,6,7,8,16,18,20,21,23,26,28,30,32} and procedures on the mandibular ramus¹⁴. The frequency of inferior alveolar nerve trauma during mandibular third molar removals is between

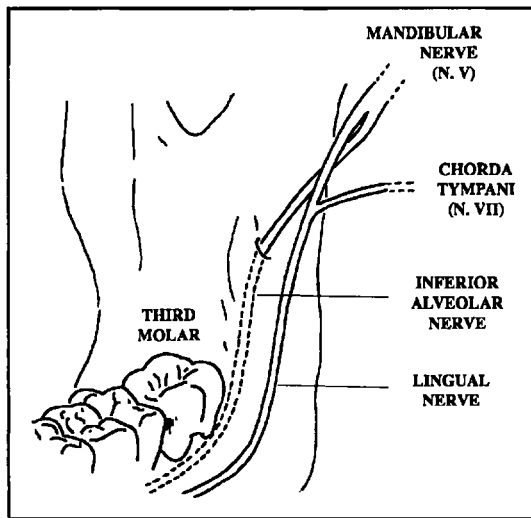


Fig 1. Schematic representation of the inner aspect of the lower jaw showing the site of the inferior alveolar and lingual nerves relative to the third molar. There are considerable variations of the normal anatomy, and thus the precise site of the lingual nerve cannot be ascertained pre-operatively. The site of the inferior alveolar nerve may be established indirectly by observing the root configuration and intimacy to the mandibular canal in plain radiographs (stereographs may be necessary in some cases). In the absence of infection, removal of only the crown of a lower third molar may be attempted in patients in which root anatomy is complicated, in order to avoid nerve damage¹⁷. Retained third molars in direct contact with the mandibular canal is about 50% more frequent in women than in men.

4.4% and 5.5%, and the corresponding range for the lingual nerve is as high as 11% to 15%^{2,16,25}. In most of the cases such a complication is temporary. In an authoritative report² of 1,117 consecutive oral surgical procedures by a variety of operators to remove a third molar the incidence of lingual nerve damage was 11%; more than half of the patients made a full recovery within 6 weeks, and most of the rest recovered within 36 weeks; permanent symptoms were present in 0.5%. Age and sex do not seem to be risk factors for the development of chronic discomfort²⁶. Minor nerve injuries due to mechanical stress leading to permanent altered sensation occurs in over one third of the patients operated with mandibular implant surgery¹¹. Such operations involve mucoperiosteal flap elevation and bone removal during site preparation and similar oral surgical procedures are known to have approximately the same incidence of this complication. Over-extension of root canal filling was reported to provoke altered sensation in the territory of the mental nerve in a single report¹³.

3. Complication associated to muscular dystrophy. As a rule, muscular diseases imply in higher anaesthetical risk. A 6-year-old boy with Becker muscular dystrophy was reported to develop a fatal complication during general anaesthesia for dental treatment⁵. The patient had a cardiac arrest associated with acute rhabdomyolysis, hyperkalemia and hypocalcemia, and died four days later. The diagnosis of Becker muscular dystrophy had been done 15 months before the accident on the basis of elevated creatine kinase, dystrophin analysis, muscle biopsy and chromosome analysis. The patient was previously asymptomatic with exception for myoglobulinuria.

CONCLUSION

While rather severe infectious and anesthesiological complications affecting the nervous system were reported, such complications were very uncommon. The commonest nervous complications of dental treatment during the last decade were related to mechanical injury of peripheral nerves during the operations. An increase in malpractice suits related to such a complication has been recognized in the last years³⁰. A retrospective questionnaire study carried out in Sweden revealed that less than 10% of the patients with iatrogenic nerve injury caused by dental treatment who claimed economical compensation were fully conscious of the risk²⁶. Third molar extraction in the lower cheek was alone the most hazardous procedure connected with mechanical nerve injuries and also with anesthesiological accidents (Fig 1). The occurrence of lingual nerve injury is so frequent in third molar extraction that a warning of its possible occurrence should be given to all patients undergoing such a procedure as part of the process of obtaining informed consent to operation.

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