Happiness is quiet nerves

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Northern Ireland BDA 2014
TRIGEMINAL FOUNDATION
Nerve Injuries
Helping to prevent, educate and manage

Read a summary of the important medical conditions that may alter dental care

Summarising the important medical conditions that ...
find out more...

Here for you
Find out more

Free CPD sign up here
Continuing Professional Development – TNI provides structured and comprehensive range of evidence-based educational activities to challenge and stimulate practitioners, specialists, consultants and all members...

Referrals
Urgent referrals

Latest from DNI blog
Challenges for Oral surgery

- **Ageing population**
  - medical complexity
  - increased complications

- **Social circumstances**

- **Mental health**

- **Litigation**
  - poor communication
  - consent
  - patient expectations
  - Specialist training

- **Specific Surgical challenges**
  - Increased complications
Healthy longevity!

The map shows how countries are ranked in the Global AgeWatch Index. Colours on a spectrum from dark green to dark red represent the ranking from 1 to 91. The higher the rank, the better the quality of life for older people. Grey is used for countries where there is not enough data to include them in the Index.

http://www.helpage.org/global-agewatch/compare-countries/
Older patient - more teeth

Adult Dental Health Survey 2009

Figure 2 - Edentate adults by country: 1978-2009
# Mental health

## Young Patients
- Suicidal teenagers
- Depressed housewives
- Substance abuse
- Self harming
- OCD

## Older patients
- Dementia
- Alzheimer's
- Parkinson's
- Post Stroke
- IHD + minor strokes

1 in 4 people will experience a mental health problem in any given year. This is the most commonly quoted statistic, and the one which has the most research evidence to support it. It came initially from a large scale study published first in 1980, then updated again 1992\[i\]. This figure is further supported by the results of all three Adult Psychiatric Morbidity Surveys\[ii\].
## Specific surgical challenges

<table>
<thead>
<tr>
<th>Medical</th>
<th>Surgical</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Obesity, IHD, Stroke, Diabetes Mellitus, Metabolic syndrome, Neoplasia, Dementia</td>
<td>• Workforce</td>
</tr>
<tr>
<td>• Selection anaesthesia</td>
<td>• Increased difficulty of surgery with age</td>
</tr>
<tr>
<td>• LA, Sedation, GA</td>
<td>• Increased complications with age</td>
</tr>
<tr>
<td>• Drugs</td>
<td></td>
</tr>
<tr>
<td>• Interactions, Haemorrhage, Allergies, Wound healing</td>
<td></td>
</tr>
</tbody>
</table>
Challenges of exodontia in an ageing patient
by Tara Renton

The World Health Organization’s definition of an aging or elderly patient is (for most developed-world countries) 65 and over. Along with increased age, the population of the developed world is increasingly dentate. Both trends will increase the likelihood for exodontia. It is generally accepted that any increase in age may have a negative effect on surgical outcomes and thus will impact on the need for exodontia and its complexity in several domains, discussed here alongside their potential implications.

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Keywords: exodontia, ageing, population, oral surgery, age, oral, complications

This baby boomer cohort have complex dental histories, often requiring specific restorative interventions not required in the younger generations, meanwhile they expect their healthcare to be free.
Future patients

- Obese
- Phobic
- Retained carious dentition + wisdom teeth
- Cardio metabolic syndrome
  - DM
  - IHD
  - Hypertensive
  - Stroke risk

http://www.youtube.com/watch?v=yKGmX2TElRQ
Drugs

Anticoagulants
- anti platelet
- anti thrombotic

Steroids

Antibiotic prophylaxis?

Immunosuppressants

Interactions?

Bisphosphonates!
## Haemorrhagic risk

<table>
<thead>
<tr>
<th>Congenital</th>
<th>Acquired</th>
<th>Drugs</th>
</tr>
</thead>
</table>
| • Haemophilia  
• Won Willebrands | • Liver disease  
• Renal disease  
• Cancer pts | • **Anti thrombotics**  
• Warfarin / Coumadin commonest anticoagulant worldwide  
• Vitamin K antagonist reducing the synthesis of factors II VII IX and X of the coagulation cascade  
• Indications-AF, PE, DVT |

TNI
No change in INR?

- **Not always safe!**
- Beware ...Factor Xa and X c inhibitors replace Warfarin
Immediate hypersensitivity to chlorhexidine is increasingly recognised in the United Kingdom.

Nakonechna A, Dore P, Dixon T, Khan S, Deacock S, Holding S, Abuzakouk M
Other challenges

• Bisphosphonates
Compromised wound healing

Increased risk of post-operative infection

Disease
- Diabetes Mellitus (Types 1 and 2)
- Alcoholism
- Cirrhosis
- Renal failure
- Splenectomy
- Malignant tumours
- Leukaemia Lymphoma Myeloma
- Collagen disease
- HIV AIDS
- Pagets

Medication
- Steroids
- Immunosuppressants/ chemotherapy organ transplant
- Bisphosphonates

Malnutrition in the older population

- The prevalence of malnutrition is high across all community and care settings in Europe.
- Existing research suggests that 46% of all hospitalised patients are malnourished on admission.
- This figure rises to over 50% among older patients.
Litigation against dentists
Surgery nerve injury - risks of surgery

70% of LN and IAN injuries present with neuropathic pain and many patients demonstrate post traumatic stress disorder in relation to the significant disability and these cannot be completely fixed – life long.

- Surgery The risks may include the probability of an infection, pathology, distal seven caries and possibly systemic disease if surgery is not administered.
Prevent WSS

Operative checklist for Dental extraction ONLY
(adapted from the WHO Surgical Safety Checklist)

SIGN IN (to be read out loud)

Before giving sedation/general anaesthetic
- Has the patient confirmed his/her identity, site, procedure and consent?
  - Yes
  - No
- Have you confirmed the teeth to be extracted against the consent form?
  - Yes
  - No
- Is the anaesthesia machine and medication check complete?
  - Yes
  - No
- Is the radiograph present and correctly labeled?
  - Yes
  - No
- Is planned treatment clearly displayed on white board in Palmer notation where the surgeon and assistant can see from operating position?
  - Yes
  - No
- Does the patient have a:
  - Known allergy?
    - Yes
    - No
  - Bleeding problem (Warfarin, Heparin, Hameophilia, other)?
    - Yes
    - No
  - Was last INR result available?
  - Yes
  - No
- Immune compromised (Diabetes, HIV, Other) and at risk of infection?
  - Yes
  - No
- Surgeon notified

Before start of dental surgery
- Have all team members introduced themselves by name and role?
  - Yes
  - No
- Surgeon and Nurse verbally confirm:
  - What is the patient’s name?
  - What procedure, and which teeth?
- Anticipated variations and critical events
  - Surgeon:
    - Are there any special equipment requirements or special investigations?
    - Are any variations to the standard procedure planned or likely?
  - Anaesthetist (for GA or sedation):
    - Are there any patient-specific concerns?
    - What is the patient’s ASA grade?
    - Any special monitoring requirements?
  - Nurse/ODP:
    - Has the sterility of the instrumentation been confirmed (including indicator results)?
    - Are there equipment issues or concerns?

TIME OUT (to be read out loud)

Teeth to be extracted (blank out missing teeth), / = selected for extraction, X = extd

| Sy | E | D | C | B | A | ABC | ABCD | E
|----|---|---|---|---|---|-----|------|---
| 8  | 7 | 6 | 5 | 4 | 3 | 2   | 1    | 8
| 5  | 6 | 7 | 8 |   |   |     |      |   

SIGN OUT (to be read out loud)

Before any member of the team leaves the surgical room
- Registered Practitioner verbally confirms with the team:
  - Has the name and site of the procedure been recorded?
  - Has it been confirmed that instruments, swabs and sharps counts are complete (or not applicable)?
  - If specimen produced please confirm it is labeled.
  - Cost for instruments swabs and sharps correct?
  - Have any equipment problems been identified that need to be addressed?
  - Are any variations to standard recovery and discharge protocol planned for this patient?
  - Recovery area is ready oxygen available, lines flushed and throat pack removed (where applicable).

The Operative checklist for Dental extraction ONLY: This modified checklist must not be used for other surgical procedures.
Valid consent

- Know your patient
- Understand their expectations
- Ensure they understand the risk benefit

- If in doubt
- DON’T PROCEED!
If only............
Why are nerve injuries such a big deal?
Complications best avoided

- Forearm the patient
  - Have an honest conversation about risks

VALID CONSENT

- Do you have the correct diagnosis?
- Can you handle the medical complexity?
- Are you able to undertake the procedure?
- **DON’T overestimate your ability or talent!**
  - Would you do this on your daughter/friend?
- Can you manage the possible complications?

- **If NO** to any of the above .... Ask for assistance get training or even better............**REFER** ?
Honesty

Come on!!
The suspense is killin' me!
Which one's ours?
Why are nerve injuries such a big deal?
Trigeminal nerve

Complex region
Consequences

Social function
Eating
Drinking
Speaking
Kissing
Make up / shaving
Sleeping

IDENTITY?
Trigeminal nerve

- Consent
- Closed injury
- Most resolve
- Type of nerve injury
- Type of patient
- Neuroplasticity

- Current surgical
- management is inadequate
Painful Posttraumatic Trigeminal Neuropathy: A Recently Recognized Entity.

Post traumatic neuropathic pain

Viral
Herpes Zoster
PHN
HIV

Chemotherapy
Diabetes

Alcoholism
Vitamin deficiency
B 1,3,6,12, E
Radiation, Burns
Demyelination
CTD, MS, GB

Post traumatic Peripheral sensory nerve injury
PTN
Post traumatic neuropathic pain

- Viral
- Herpes Zoster
- PHN
- HIV
- Chemotherapy
- Diabetes

Vitamin deficiency B 1,3,6,12, E
Radiation, Burns
Demyelination CTD, MS, GB

Post traumatic Peripheral sensory nerve injury
PTN
Risk factors for PTN

- >50 years
- Multiple insults
- Non respondent to anti inflammatory pain killers (NSAIDs Paracetamol)
- Better in mornings
- Does not disturb sleep
- Worsens during day
- Worsens with stress, tiredness and illness
- Either
  - Constant burning
  - Elicited neuralgic
  - Or combination

Table 2
Definitions of common features suggestive of neuropathic pain

<table>
<thead>
<tr>
<th>Term</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paresthesia</td>
<td>An abnormal sensation, whether spontaneous or evoked</td>
</tr>
<tr>
<td>Dyesthesa</td>
<td>An unpleasant sensation, whether spontaneous or evoked</td>
</tr>
<tr>
<td>Hypoesthesia</td>
<td>Decreased sensitivity to stimulation (tactile or thermal; both are frequent)</td>
</tr>
<tr>
<td>Hyperesthesia</td>
<td>Increased sensitivity to stimulation (tactile or thermal; both are rare)</td>
</tr>
<tr>
<td>Hypoalgesia</td>
<td>Diminished pain response to a normally painful stimulus</td>
</tr>
<tr>
<td>Hyperalgesia</td>
<td>An increased response to a stimulus that is normally painful</td>
</tr>
<tr>
<td>Allodynia</td>
<td>Pain due to a stimulus that does not normally activate the nociceptive system</td>
</tr>
</tbody>
</table>
Consequences of Trigeminal nerve injury
Damage to sensory nerve

• **Pain** – **hyperaesthesia**
  - allodynia pain with non noxious stimulus
  - pain on touch/cold/hot
  - hyperalgesia increased pain to painful stimulus

• **Altered sensation**
  - paraesthesia – pins and needles, formication, many descriptions
  - dysaesthesia – uncomfortable sensations often burning

• **Numbness** – **hypoaesthesia**

Wheal and flare
620 patients with nerve injuries seen over 4 years at KCH

Pain
70% of Lingual or Inferior Alveolar Nerve injuries

Functional
Eating, speaking, drinking, sleeping, kissing, make-up, shaving, tooth brushing

Psychological
50% chronic pain sufferers are depressed
Causes of peripheral nerve injury

- Diabetes
- HIV
- PHN
- Chemotherapy
- MS
- Post surgical traumatic neuropathy
- Parkinson’s
- Malignancy
- Drugs - Growth hormone injections
**Kehlet et al, 2006 in Lancet**

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Estimated incidence of chronic pain</th>
<th>Estimated chronic severe (disabling) pain (&gt;5 out of score of 10)</th>
<th>US surgical volumes (1000s)†</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amputation²</td>
<td>30–50%</td>
<td>5–10%</td>
<td>159 (lower limb only)</td>
</tr>
<tr>
<td>Breast surgery (lumpectomy and mastectomy)³</td>
<td>20–30%</td>
<td>5–10%</td>
<td>479</td>
</tr>
<tr>
<td>Thoracotomy⁴⁻⁷</td>
<td>30–40%</td>
<td>10%</td>
<td>Unknown</td>
</tr>
<tr>
<td>Inguinal hernia repair⁸⁻¹⁰</td>
<td>10%</td>
<td>2–4%</td>
<td>609</td>
</tr>
<tr>
<td>Coronary artery bypass surgery¹¹⁻¹³</td>
<td>30–50%</td>
<td>5–10%</td>
<td>598</td>
</tr>
<tr>
<td>Caesarean section¹⁴</td>
<td>10%</td>
<td>4%</td>
<td>220</td>
</tr>
</tbody>
</table>

*Gall bladder surgery not included, since preoperative diagnosis of pain specifically from gall bladder is difficult and persistent postoperative pain could therefore be related to other intra-abdominal disorders. †National Center For Health Statistics, Ambulatory and Inpatients Procedures, USA, 1996.

**Table 1: Estimated incidence of chronic postoperative pain and disability after selected surgical procedures**

30% get persistent pain 10% are severely affected

? 0.02% of trigeminal severely affected (Nixdorf 2010)
Neuropathic pain
Functional problems
Psychological consequences

- Depression
- Anger
- Post traumatic stress disorder
- Victim of abuse
- Loss of ability to trust

- Kubler Ross
Article in Press

PainDETECT: a suitable screening tool for neuropathic pain in patients with painful post-traumatic trigeminal nerve injuries?


Accepted 3 July 2013. published online 07 August 2013. Corrected Proof

Abstract

The PainDETECT questionnaire (PD-Q), originally developed and validated in a multicentre study of neuropathic pain (NeP) patients with back pain, is increasingly being applied to other pain conditions. The present study assessed whether the PD-Q would be a suitable screening tool for detecting NeP in patients with post-traumatic inferior alveolar nerve injury (iANi) and lingual nerve injury (LiN). A prospective cohort of patients with clinically diagnosed neuropathy was given the PD-Q at their clinic appointment, or it was sent to them after their consultation. Eighty-nine patients (iANi = 56, LiN = 33) were included in the study, 75 of whom suffered from painful neuropathy. Of the patients who completed the questionnaire fully (n = 56), allowing a summary score to be calculated, 34% were classified as having 'likely NeP' according to the PD-Q; 41% of patients scored in the uncertain classification range and the remaining quarter in the 'likely nociceptive' classification. There
Valid consent?

- Know your patient
- Understand their expectations
- Ensure they understand the risk benefit

- If in doubt
- DON’T PROCEED!
Recent study @ KCL on 60 implant nerve injury patients. 70% experienced Dysaesthesia / Pain (95% implant pts).

- 70% of patients suffer from a combination of numbness, altered sensation and neuropathic pain.

- Less than 30% of patients are appropriately warned of nerve injury in high risk procedures.

Valid consent
Patient’s perspective

If I Knew Then...
So how do we avoid nerve injuries?
What are the risk factors?

- 662 were obtained from the search, from which 25 were selected accomplishing the inclusion criteria. Moreover, seven important articles were selected from the references of the ones mentioned, obtaining a total of 32 articles for the review.

- **LNI & IANI**
  - Age of the patient
  - Time of surgery
  - Intra-operatory exposure of the nerve
  - Un-erupted tooth

- **LNI**
  - Technique access for the lower third molar extraction
  - the surgeon's inexperience.

- **IANI**
  - The radiological examination is useful to evaluate the nerve damage and to decide on the surgical technique
When can they happen?

• Pre operative assessment
• Local anaesthesia
• Operative factors
• Post operative care
Nerve injuries occur due to:

- LA IDBs
  - Articaine as infiltration only with no ID blocks?
    - Peterson 2004; Heller & Shankland 2001
- Poor Planning
- Poor Placement/execution
- Inadequate Post operative care

Why do they happen?

- Chemical (local anaesthetic, haemorrhage, BIOSS,)
- Physical trauma
- (preparation of implant bed, over torqueing implant during placement)
- Heat
- Prolonged neural inflammation (local and patient factors)
What procedures?
What procedures?
UK dentists' experience of iatrogenic trigeminal nerve injuries in relation to routine dental procedures: why, when and how often?

T. Renton, H. Janjua, J. E. Gallagher, M. Dalgleish & Z. Yilmaz

- The majority of dentists use Lidocaine 2% for inferior dental blocks (IDBs) and many are already using Articaine Buccal infiltration technique.
- The incidence of nerve injury related to dental IDBs is 1 in 14,000 patients undergoing routine dentistry and 1 in 3,300 undergoing care by specialists.
- Notes the lack of knowledge by dentists on where to seek advice and report these injuries.
Local anaesthesia

- If a patient has sharp neuralgic intense pain during delivery of the IDB they are 60% more likely to experience persistent neuropathy

OUCH!

- Smith and Lung 2006
Local anaesthesia

No difference in efficacy between Lidocaine 2 % and Articaine 4% inferior dental blocks

- **Isabel Peixoto Tortamano, DDS, MSc, PhD, Marcelo Siviero, DDS, MSc, Carina Gisele Costa, DDS, MSc, PhD, Inês Aparecida Buscariolo, DDS, MSc, PhD, and Paschoal Laércio Armonia.** A Comparison of the Anesthetic Efficacy of Articaine and Lidocaine in Patients with Irreversible Pulpitis. *J Endodontics* Volume 35, Number 2, February 2009
Local anaesthesia

Actual LA nerve injury incidence

- GDP restorative procedures
  - 1 in 14K
  - 25% permanent

- Oral surgery
  - 1 in 3.3K
  - 29% permanent

Compare this with anaesthetic LA block procedures. NAP3 reports the estimated that nerve injury resulting from neuroaxial blocks (epidurals, spinals and combined epidural with spinals) resulted in sensory or motor nerve injury in 1 in 24-54K patients (and paraplegia or death in 1 in 50-140K patients)
Local anaesthesia

Smart LA

- Articaine 4% Buccal Infiltration
- +/- IDB Lidocaine 2%

- Articaine 4% Buccal Infiltration
- Post + ant near Mental foramen
- +/- Lingual Inf Lidocaine 2%

- Buccal infiltration + Lingual both Lidocaine 2%

No palatal blocks required!

- **Anesth Prog.** 2013 Summer;60(2):42-5. doi: 10.2344/0003-3006-60.2.42. Comparison of buccal infiltration of 4% articaine with 1 : 100,000 and 1 : 200,000 epinephrine for extraction of maxillary third molars with pericoronitis: a pilot study.

- **Lima JL Jr, Dias-Ribeiro E, Ferreira-Rocha J, Soares R, Costa FW, Fan S, Sant'ana E.** Prospective, double-blind, controlled clinical trial involved 30 patients between the ages of 15 and 46 years who desired extraction of a partially impacted upper third molar with pericoronitis.
Successful extractions in
Incisors-premolars 90%
M1Ms 60%
M2Ms 75%

87% success!

Prospective audit 280 extractions by dental UGs
- no palatal blocks given
- Articaine infiltration
- Lidocaine IDB rescue
Prevent Local anaesthesia induced nerve injuries by:

- Avoid multiple blocks
- No IDBs under GA
- Avoid high concentration IDBs (Articaine, Mepivacaine, Prilocaine)
- Stick to Lidocaine ID blocks for now!
- Is the future Articaine as infiltration only with no ID blocks????????

Local anaesthesia

- Reduce nerve injury risk during surgery by using infiltrative anaesthesia
- If the patient feels pain during elevation of tooth, endo prep or implant preparation…………………
  - Stop surgery
- Reassess re x ray and reassess safety zone

Elective M3M surgery

10 million M3Ms removed USA per year
60% elective surgery

Costing $US 4.2 billion

11000 pts permanent nerve injury!

‘Silent epidemic’ of iatrogenic nerve injury


- Mythology of 8s
- Overall 12% associated with pathology
  - same as appendicitis and cholecystitis
  - 8% pericoronitis
  - 3% caries lower 7s
  - 0.048% resorption of adjacent tooth
  - 0.0085% internal resorption
  - 0.0165% cyst formation
What has been the United Kingdom's experience with retention of third molars?

Renton T, Al-Haboubi M, Pau A, Shepherd J, Gallagher JE.

M3M related nerve injury

Inferior alveolar nerve

Lingual nerve
99% US oral surgery practitioner
52% after defining the buccal approach

Prevention of lingual nerve injury in TNI
Spot the lingual nerve!
Prevention of lingual nerve injury in

During lingual nerve exploration

TNI
Prevention of IAN injury

- Is the M3M high risk?
- Prevention of Inferior alveolar nerve injuries
Remember other teeth can be high risk crossing

IDC

Prevention of IAN injury
Prevention of IAN injury

Risk

- 0.5% of cases permanently
- 2% of cases temporarily

BUT if the teeth are superimposed on the IAN canal

- 20% temporary
- 2% permanent

Risk factors

- increased age
- difficulty of surgery
- proximity to the IAN canal

USA-If a lower third molar is high risk -----CBCT
Prevention of IAN injury

Radiographic factors

OLD

- Diversion of the canal
- Darkening of the root
- Interruption of the canal LD

NEW

- Juxta-apical area
- Deviation of canal
- Narrowing / darkening of roots
Prevention of IAN injury

Assessment nerve ‘at risk’

- Tooth crossing lamina dura of IAN canal on plain film?
- Associated radiographic signs?
- Tooth requires extraction consider CBCT
Tooth sectioning

• If the tooth is **high risk and non vital**
• Then roots should be sectioned to minimise IAN injury
Coronectomy

- Prospective randomised study (196 M3M procedures)
- Factors associated with failed coronectomy
  - Female patient
  - Conical roots
  - Age

Surgical removal 102 teeth
  - Temp IAN 20%
  - Perm IAN 2%
  - AO 11%

Coronectomy 56
  - Temp IAN 0%
  - Perm IAN 0%
  - AO 9%

Attempted coronectomy 36
  - Temp IAN 9%
  - Perm IAN 0%
  - AO 10%

Renton T et al. A prospective randomized study assessing coronectomy versus removal in third molar surgery. BJOMS 2005
Prevention of IAN injury

Can we avoid root removal?
## Incidence of nerve ‘at risk’

<table>
<thead>
<tr>
<th>Reference</th>
<th>No of cases</th>
<th>Buccal</th>
<th>Inferior</th>
<th>Lingual</th>
<th>Inter radicular</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kaeppler et al 2000</td>
<td>345</td>
<td>53.6</td>
<td>6</td>
<td>13</td>
<td>26.8</td>
</tr>
<tr>
<td>Mahasanti piya et al 2000</td>
<td>202</td>
<td>15.3</td>
<td>42.6</td>
<td>30.2</td>
<td>12.4</td>
</tr>
<tr>
<td>Ito et al 1994</td>
<td>47</td>
<td>55.3</td>
<td>36.2</td>
<td>2.1</td>
<td>6.4</td>
</tr>
<tr>
<td>Tanaka et al 2000</td>
<td>209</td>
<td>39.2</td>
<td>47.4</td>
<td>10</td>
<td>3.3</td>
</tr>
<tr>
<td>Hashizume et al 2004</td>
<td>68</td>
<td>23.5</td>
<td>33.8</td>
<td>39.7</td>
<td>2.9</td>
</tr>
<tr>
<td>Maegaw et al 2003</td>
<td>47</td>
<td>51.1</td>
<td>19.1</td>
<td>25.5</td>
<td>4.3</td>
</tr>
</tbody>
</table>

Still 15-100% of High risk M3Ms coronectomied

![Image](image.png)
Prevention of IAN injury

Role CBCT in localising IAN

- Localising IAN proximal
to lower teeth
- DISTANT from nerve???????
Prevention of IAN injury

Role CBCT localising IAN

Localising IAN proximal to lower teeth

PROXIMAL to nerve
DO not rely on radiologists report

Read the CBCT your self!

CBCT Radiation dose reduction
Prevention of IAN injury

Remove the tooth or coronectomy?
Distant- remove ‘Snake like’ or Perf-Coronectomy
Prevention of IAN injury

The nerve doesn’t have to ‘perforate’ tooth...........

‘Snake’ nerves
Prevention of IAN injury

- IAN canal cortication loss
- Bifid IDC
- Loss of lingual plate 30%

Notes on coronectomy. Renton T. Br Dent J. 2012 Apr 13;212(7):323-6
Prevention of IAN injury
Prevention of IAN injury

Coronectomy
Prevention of IAN injury

Coronectomy

Risks

Intra-operative mobilisation of M3M roots
Early post operative infection
Late post operative infection (with eruption)
Second surgery

• Article first published online: 14 JUN 2010 DOI: 10.1111/j.1752-248X.2010.01079.x
Prevention of IAN injury

Coronectomy complications

Recent case complications

- Eruption
- Infection >2 episodes of ‘dry socket’ Remove roots
  - Take care with iodoform products
- Infection plus IAN paraesthesia
  - Remove roots

Coronectomy complications

- Dry socket – treat as dry socket
- Recurrent dry socket +/- intermittent IAN neuropathy (= inflammatory neuritis)
- Late eruption ??

Leung YY, Cheung LK *Coronectomy of the Lower Third Molar Is Safe Within the First 3 Years* J Oral Maxillofac Surg. 2012 Apr 9. 98 pts 3 years 3% eruption rate
Prevention of IAN injury

Coronectomy other applications
Prevention of IAN injury

Coronectomy ankylosed teeth
Prevention of IAN injury

How CBCT has modified my approach?

CBCT assessment of IAN position

No inferior alveolar nerve injuries
Another indication for elective coronectomy
Reduced necessary coronectomies by > 80%
Elective section of roots with no intraoperative mobilisation of roots
NEW indication for

Notes on coronectomy. Renton T. Br Dent J. 2012 Apr 13;212(7):323-6
Algorithm for coronectomy decision.

- Is the tooth vital?
- Is the patient non-immuno compromised?
- Is the tooth crossing BOTH IDC lamina dura?

**NO**

**REMOVE THE TOOTH**

CBCT findings:
- Are the roots perforated by the IDC or an IAN branch?
- Is the IAN intricately associated with indented M3M root?
- Is there missing lingual plate related to root and the adjacent IDC?

**YES**

**INTENTIONAL CORONECTOMY**

**NO**

- Are the roots proximal but separate from the IDC?
- During decoronation do the roots move?

**YES**

**INTENTIONAL CORONECTOMY**

Coronectomy, spare the IAN! Dental Update 2013 in press
Update on coronectomy. A safer way to remove high risk mandibular third molars.

Renton T.
King’s College London Dental Institute, King’s College Hospital Foundation Trust, Denmark Hill Campus, Bessemer Road, London SE5 9RS, UK.

Abstract
Decoronation of high risk mandibular third molars (M3Ms) has become common practice in parts of UK and USA. With the introduction of Cone Beam CT scanning, there has been an evolution in the practice, with avoidance of unnecessary coronectomies based on CBCT findings. Also, additional anatomical features found only on CBCTs have introduced possible additional indications to undertake intentional coronectomy. Trigeminal nerve injury is the most problematic consequence of dental surgical procedures with major medico-legal implications. Iatrogenic injuries to the third division of the trigeminal nerve remain a common and complex clinical problem. Altered sensation and pain in the orofacial region may interfere with speaking, eating, kissing, shaving, applying make-up, toothbrushing and drinking; namely just about every social interaction we take for granted. Usually after oral rehabilitation, the patient expects and experiences significant improvements, not only regarding jaw function, but also in relation to dental, facial, and even overall body image. Thus these injuries have a significant negative effect on the patient’s self-image and quality of life and the iatrogenesis of these injuries lead to significant psychological effects. Clinical Relevance: Coronectomy is an alternative procedure to complete removal of a mandibular third molar in situations where there is high risk of damage to the inferior alveolar nerve.

PMID: 23909229 [PubMed - in process]
Damage to the inferior alveolar nerve as the result of root canal therapy. 

Toxicity of commonly used dental products

- **BioOss**
  - pH 8.4

- **Socket Medicaments**
  - Alvogyl, Whiteheads varnish, Corsodyl and Surgicel (pH 5.8)

- **Endo Medicaments**
  - Formocresol (pH 12.45 +/- 0.02)
  - Sodium hypochlorite (pH 11-12)
  - Calcium hydroxide (Calyxl). (pH 10-14)
  - Antibiotic-corticosteroid paste (Ledermix) (pH 8.13 +/- 0.01)
  - Neutral (pH 7.35-7.45)
  - Eugenol (pH 4.34 +/- 0.05)
  - Iodoform paste (pH 2.90 +/- 0.02)
Prevention of Endo IAN injury

30 hours to remove endo overfill OR tooth
Prevention of Implant nerve injury

Dental implant nerve injury

- Inferior alveolar nerve injury
  - occurs in relation to dental implant treatment

- Implant surgery
  - is ELECTIVE

Thus any evidence of poor practice;
- Informed consent
- Planning/negligence
- Execution
- Post operative follow up/ advice and referral
Nerve Damage (Third Molars) 30.1%
Nerve Damage (Other) 9%
Post-op Complications 19.7%
Orthognathic Surgery 6.6%
Collateral Damage 11.8%
Medical Consequences 5.5%
Implants 4.4%
Other 5%

Implant related cases
Wrong position and failure (current $164,000 i/d 1998)
placed into ID nerve (current $126,000)
failure associated procedures (eg bone graft)
Ireland $3.6 million
Pre-op assessment and communication, collateral damage (sinus lift)

Other 1.5%
TMJ Surgery 1.2%
Consent Only 0.5%
Failure to diagnose/treat 0.3%
Maxillary Sinus 1.5%
Misc 5%
GDC warns general dental practitioners on implantology.

Post-implant neuropathy of the trigeminal nerve. A case series.

T. Renton, A. Dawood, A. Shah, L. Searson and Z. Yilmaz

Background The incidence of implant-related inferior alveolar nerve injury is not clear, and the perception, pain profiling and functional difficulties associated with such injuries are not well understood. This study prospectively reviewed thirty cases of implant-related inferior alveolar nerve injury at a specialist nerve injury clinic. Methods Neurosensory examination of the perception, pain profiling and functional difficulties. Diagnosis was made when the patient was aware of signs or symptoms of impairment. Over 70% of patients were referred after six months. Films were taken in the oral cavity to assess the bony anatomy, CBCT (10%), and a CT scan of the nasal cavity (50%). Radiographic evidence of an abnormality was seen in 30% of cases. Results were compared to the clinical findings. All patients had a history of either smoking or alcohol addiction. Conclusions Awareness of the incidence of neuropathic pain following implant surgery is important to prevent future injuries.

INTRODUCTION

Trigeminal nerve injury is a frequent problematic consequence of dental surgical procedures with major medico-legal implications. The incidence of lingual nerve injury has remained static in the UK over the last 30 years. However, the incidence of inferior alveolar nerve injury has increased as a result of implant surgery and endodontic therapy.

Altered sensation and pain in the oral region may interfere with speaking, eating, kissing, and any activity that involves brushing or gripping. In fact, just about every social interaction we take for granted. These injuries therefore have a significant effect on the patient's quality of life and the intrusiveness of these injuries may lead to further significant psychological effects.

METHODS

Subjects

A total of 287 patients with trigeminal nerve injuries collected over three years.

Researcher: King's College London Dental Institute

Analysis: Analysis of 30 patients with nerve injuries and found problems with pain, speech, eating and kissing.

Dental implant procedures have risen in number in recent years.

Related Stories

Dental body's complaints backing


government drops key Lords vote

eva rausing 'found dead in home'
diamond responds to MPs' claims

Terry 'angry over racism claims

PC shooting suspect found dead

Features & Analysis

Summer washout

The culprit behind our very wet weather

Just for show?

Does terrorist threat to Olympics justify missiles being deployed?
Prevention of Implant nerve injury

What Quality assurance?

- **Training**
  - RCS Training standards
  - GDC Policy Statement
  - Registerable Qualifications

- **Equipment** - MHRA

- **Patient information guidance**

- **Treatment Guidelines**
  - RCS 2011
  - EAO Radiographic Guidelines 2010
  - ADI Implant sand BPs 2012
  - Guidelines for selecting appropriate NHS patients to receive treatment 2012
Tooth preservation or implant placement
A systematic review of long-term tooth and implant survival rates

Liran Levin, DMD; Michal Halperin-Sternfeld, DMD, MSc

Implant therapy is regarded as a safe and reliable method of treating patients with complete or partial edentulism. The use of dental implants as a replacement for “hopeless” or missing teeth has been increasing steadily, probably owing to the high predictability and survival rates, as reported in numerous studies, together with supporting technological advances. Given the increasing popularity and clinical success of dental implants, clinicians may tend to believe that they are as good as natural teeth. This could result in the extraction of teeth that are salvageable, on the basis of convenience rather than as

Abstract

Background. For the past few decades, dental implants have served as reliable replacements for missing teeth. However, there is an increasing trend toward replacing diseased teeth with dental implants.

Types of Studies Reviewed. The authors conducted a systematic review of long-term survival rates of teeth and implants. They searched the MEDLINE database for relevant publications up to March 2013. They considered studies in which investigators assessed the long-term effectiveness of dental implants or that of tooth preservation. They included only studies that had follow-up periods of 15 years or longer.

Results. The authors selected 19 articles for inclusion. Investigators in nine studies assessed the tooth survival rate, whereas investigators in 10 studies assessed the implant survival rate.
Prevention of Implant nerve injury

Over prescription
Prevention of Implant nerve injury

Wrong prescription

The system = broken so need independent review (Steele et al 2009)
Peri-implantitis

Fransson et al. 2005

BOP &/or pus + ≥ 3 threads (1.8 mm) bone loss & at least 0.1 mm bone loss after 1st year in function

- 25%

Roos-Jansåker et al. 2006

BOP &/or pus ≥ 3 threads (1.8 mm) bone loss after 1st year in function

- 16%

Zitzmann et al. 2009

BOP & bone loss ≥ 2.5 mm up to

- 55%

Koldsland et al. 2010

BOP & PPD ≥ 4 mm + Bone loss ≥ 2 mm

- 25%
Prevention of Implant nerve injury

Risk factors for peri implantitis

- Poor Oral Hygiene
- History of Periodontitis
- Cigarette smoking


*Peri-implant lesions don’t respond predictably to either non-surgical or surgical treatments unlike the treatment of periodontitis. It seems that progression of peri-implantitis is more akin to that seen for deep furcations than other periodontal lesions. This may be due to accessibility difficulties in both situations* – Renvert & Polyzois 2014
One certainty!

Increased medico legal indemnity charges!
What is the incidence of IRNIs?

? 3%

- https://www.surveymonkey.com/s/IANI_SURVEY
• ADI Consultation paper on prevention and management of dental implant related nerve injury…2013 online

• Risk management if IRNIs 2013 (below)
• Assessment and management of IRNIs
• Questionnaire. Online 2013

Risk Management and Prevention of Inferior Alveolar Nerve Injury (IANI) associated with Dental Implant Surgery

Author of original consultation paper: Professor Tara Renton, Kings College, London
Edited by the ADI Guidelines Subcommittee: Ucer, C; Wright, S; Scher, E; Slade, K.
Prof. Tara Ranton, BDS, MDS, PhD, FDS, RCS, FDSRCS(Glas), FHEA (Specialist in Oral Surgery) is a dentist with a particular interest in trigeminal nerve injuries and pain. She was awarded her chair at King’s College London in 2008, she has established an academic training program, which has trained 5 Academic Oral Surgery Splits, of whom 3 are undertaking PhDs. She was recently appointed lead for orthodontic pain at NPSO, a nationally recognized pain-management program based at St Thomas’ Hospital. Tara is the national advisor for oral surgery. She is an elected council member for BDA and is an elected member of the RCS England FDS Board.

Marie Devine, BDS (Hons), MDS, MSc, LRCPS(RCPS), is an Academic Clinical Fellow in Oral Surgery at King’s College Hospital. Her current research activity involves iatrogenic trigeminal nerve injury. She qualified from Nicosia University in 2008 and worked in a variety of hospital dentistry, general practice and maxillofacial surgery posts before taking up her specialty training in King’s College Hospital.

INTRODUCTION

Minimizing adverse events related to patient care is paramount. Trigeminal nerve injuries related to dentistry are a recognized complication and avoidance in most instances. Implant treatment and nerve injuries are an increasingly common cause for medicolegal complaints and resultant compensation to patients with lifelong orofacial neuropathy (Fig. 1).

The inferior alveolar nerve (IAN) is at risk from a variety of dental procedures as it is contained within the bony canal predisposing it to iatrogenic trauma and a higher incidence of permanent damage. Causes of inferior alveolar nerve injury (IANI) include local anesthetic injections, third molar surgery, implants, endodontics, ablative surgery, trauma and orthognathic surgery. IAN neuropathy related to third molar surgery or inferior alveolar block injections is usually temporary but can persist and become permanent.

The trigeminal nerve is the largest sensory nerve in the body, supplying the orofacial region. Iatrogenic (caused by doctors or dentists) trigeminal nerve injuries (TNI) result in pain in 79% of patients resulting in interference with speaking, eating, kissing, shaving, applying makeup, tooth brushing and drinking. In fact, just about every social interaction we take for granted. Thus these injuries have a significant negative effect on the patient’s self-image, and quality of life as well as significant psychological effects (Ranton & Yilmaz 2011).

At the same time the predictability of dental implants and expectations and demands of patients have moved to a position where dental implants are now seen as a routine treatment option when considering the restoration of missing teeth (Choi et al. 2011). More recently complaints and medicolegal action against dentists in the United Kingdom have increased significantly and many of these arise from implant-related treatment (Choi et al. 2011), which in part is contributed to by ‘Implant tourism’ (Barnes et al. 2010).

Although nerve injury occurs in a minority of patients undergoing implant therapy, the consequences can be devastating for both patient and clinician (Ranton & Yilmaz 2011). The most significant issue with implant-related nerve injuries is that they are entirely avoidable as this is elective surgery and potentially permanent with or without surgical intervention (Ranton et al. 2012, Brook 2012). Published guidelines pertaining to dental implant therapy are relatively scarce and mainly address the prevention of implants rather than their application (Coffredon et al. 2008, Dawson & Cardaci 2006, van Waas et al. 1991, Academy of Osseointegration 2010).

Prevention of Implant nerve injury

- The incidence of implant related inferior alveolar nerve (IAN) nerve injuries vary from 0-40%. Bone graft harvesting is also associated with IAN injuries

- Patients attending my nerve injury clinic
- 10% of patients presenting with iatrogenic trigeminal nerve injury in 2000 now 37% in 2013!
Prevention of Implant nerve injury

Permanency of 60 IRNIs

Neuropathy

- missing
- permanent
- temporary
- too early to say

82%
Effects of injury on IAN

- The IAN is contained within a bony canal which predisposes it to compression and possible ischaemic type injury. **Compression of peripheral sensory nerves over 6 hours can evoke nerve fibre atrophy**
- Shimpo T, Gilliatt RW, Kennett RP, Allen PJ. Susceptibility to pressure neuropathy distal to a constricting ligature in the guinea-pig. J Neurol Neurosurg Psychiatry. 1987 Dec;50(12):1625-32
- **Ischaemia alone without direct nerve damage will cause sufficient neural inflammation and damage to cause permanent nerve injury.**
- **Three months after the IAN injury, permanent central and peripheral changes** occur within the nervous system subsequent to injury, that are unlikely to respond to surgical treatment intervention
Prevention of Implant nerve injury

Interference of symptoms with the lifestyle for IRNIs.

![Graph showing frequency of interference with various activities]

- Eating
- Kissing
- Brushing teeth
- Drinking
- Speech
- Socialising
- Confidence
- Make-up application
- Shaving
- Work

Frequency
Prevention of Implant nerve injury
Informed consent

- Recent study @ KCL on 60 implant nerve injury patients

95% experienced Dysaesthesia / Pain

- 70% of patients suffer from a combination of numbness, altered sensation and neuropathic pain
- Less than 24% of patients are appropriately warned of nerve injury in high risk procedures

Every patient should understand their choices!

The good the bad and the ugly!
Prevention of Implant nerve injury

Issues ......

- Consent
- LA protocol
  - Articaine as infiltration only with no ID blocks?
    Peterson 2004; Heller & Shankland 2001
- Planning
- Placement/execution
- Post operative care
- Management of IRTNI
- Post implant pain
- Litigation

Renton T. Prevention of iatrogenic inferior alveolar nerve injuries in relation to dental procedures. SADJ. 2010 Sep;65(8):342-4, 346-8, 350-1
Preoperative assessment

- Radiographic
- Clinical
- 25% of edentulous patients present with a degree of altered IAN function, thus reinforcing the guidelines on the necessity of preoperative neurosensory evaluation.

CHECK PREOP!!

 Prevention of Implant nerve injury

Imaging
- What radiography?
  - Cone Beam CT Scan
- Planning
  - Software
    - Simplant
- Assessment of IAN position
  - Safety zone >2mm IAN canal
  - ? Should be >4mm
  - What is the actual position of nerve?????

IAN plotted on Simplant using 5 points!
80% of clinicians questioned get technician to draw in
Can you read the full CBCT??
Smart LA

- Articaine 4% Buccal Infiltration
- NOT IN but near Mental foramen
- +/- Lingual Infiltration
- Or IDB Lidocaine 2%


Prevention of Implant nerve injury

Are you sure you know where the nerve is?
Beware the anterior loop / mental foramen!!!

- Adequate imaging?
- Here or there?
- Is it bifid?
Prevention of Implant nerve injury

Are you REALLY sure???????
Prevention of Implant nerve injury

Courtesy of Dr. David R. Nelson BDS, MSc.(Imp.Dent), Clinical Director, Cranmore Clinical Tutor, Institute of Postgraduate Dental Education, University of Central Lancashire Tutor, School of Dentistry, Queen's University Belfast. Fellow, International Team for Implantology
What’s wrong with short implants?
Prevention of Implant nerve injury

Proximity of implants to IDC in injured cases

Radiographic signs

- Prep breach IAN canal: 34%
- Implant breach of IAN canal: 20%
- Either cross the IAN canal: 14%
- Unknown: 12%
- No breach or crossing of IAN canal: 20%

84%
Prevention of Implant nerve injury

Signs of intra-operative nerve injury

- Pain on injection of LA
- Brisk persistent bleed
- Intense sudden pain during preparation or placement

- Any protrusion into the IDC or breech, will result in acute and often severe neuralgic type pain intra-operatively

Intraoperative strategies to minimise nerve injury

- Good planning >4mm safety zone
- Infiltration anaesthesia
- Drill stops
- ITI recommend drill 6mm then take LCPA with measure to gauge position
- Use system with shorter prep drill than implant
Prevention of Implant nerve injury

Ridge enhancement

• pH >8.6 in vivo!
Intraoperative complications…

Should you delay placement?

Prevention of Implant nerve injury

Intraoperative complications

- Perm injury
- Temp injury

Frequency

- None
- Pain
- Bleed
- Bleed and pain
- Neural Stimulation
- Give during prep

- Perm injury
- Temp injury
Prevention of Implant nerve injury

Intra-operative risk factors

- Sudden ‘give’ during preparation
- Extrusion of debris into canal
- Intra-operative IAN bleed

Do not place implant immediately; delay 2-3 days.
Post operative protocol

- Routinely check on patient early post operatively at 6 - 12 hours

- If patient has neuropathy immediately after local analgesia has worn off:
  - REMOVE the implant in less than 24 hours
  - Steroids and NSAIDS
  - Refer
Post operative protocol

- Routinely check on patient early post operatively at 6 hours

- If patient has neuropathy immediately after local analgesia has worn off:
  - REMOVE the implant in less than 24 hours
  - Steroids and NSAIDS
  - Refer

Prevention of Implant nerve injury
Prevention of Implant nerve injury

Does removal of implant work?

![Bar chart showing frequencies of implant removal](chart.png)

- No: 34
- <30 hours: 6
- >30 hours: 16

Frequency of Implant removal
Prevention of Implant nerve injury

Does removal of implant work?

- No: 34 cases, 96% permanent
- <30 hours: 6 cases, 16% permanent
- Yes: 16 cases, 75% permanent

Frequency of implant removal and its impact on nerve injury prevention.
Management of IRTNIs (Acute)

- (LA IDB lasts 3 hours and 25 minutes)
  - Check on Patient after 6 hours (Home check)
- IAN NEUROPATHY? (extreme pain/ mixed symptoms large neuropathic area)
  - Yes
- Consult patient, check for area of neuropathy and signs of nerve injury
  - Confirmed
    - Remove implant < 30 hours
    - + High dose oral NSAIDs (600-800mgs Ibuprofen PO QDS)
    - Prednisolone 5 day step down does 50-40-30-20-10mg PO
      - (check medical history!)
    - Vitamin B complex/ Tricyclic anti depressants/ pregabalin
      - Review
IRNI 3 days old or more

Manage therapeutically

- Surgery - removal of implant *doesn’t work*
- Many patients destined to a life of neuropathic orofacial pain
- Post implant pain
- Detectable subclinical IAN neuropathy in patients subsequent to implant placement using electrophysiological methods (Eliav E et al IASP 2010)


Management of V nerve injury

When it goes wrong....... If nerve injury does happen What next?
Management of V nerve injury

• If the patient has a good experience they are less likely to complain
Management of V nerve injury

Optimum

• Dentist
  o Patients expectations previously managed (good informed consent)
  o Don’t wait for the patient to let you know things have gone wrong!.......Home check
  o Maintain communication
  o Advice / refer
Home Check on your patient

• Be honest
• Contact them after surgery
• Appropriately advise and manage problems

• If you’re not sure ask for help /advice
Don’t panic………………Say sorry!

- Not an admission of guilt just shows empathy!
- You should already have had a conversation about the risks!
Managing iatrogenic trigeminal nerve injury: a case series and review of the literature

T. Renton, Z. Yilmaz
King's College London Dental Institute, Denmark Hill Campus, London, UK

Abstract. This study describes the management of 216 patients with post-traumatic iatrogenic lingual nerve injuries (LNIs; n = 93) and inferior alveolar nerve injuries (IANI; n = 123). At initial consultation, 6% IANI and 2% LNI patients had undergone significant resolution requiring no further reviews. Reassurance and counselling was adequate management for 51% IANI and 55% LNI patients. Systemic or topical medication was offered as pain relief to 5% of patients. Additional cognitive behaviour therapy (CBT) was offered to 8% of patients. Topical 5% lidocaine patches reduced pain and allodynia in 7% of IANI patients, most often used without any other form of management. A small percentage of IANI and LNI patients, usually those who were not suitable for other procedures, were managed with surgical procedures to the mandible, maxilla, mandibular canal, or lingual nerve.
Early Postoperative Management

- Routinely check on patient early postoperatively at 6 hours
- Check for relevant neuropathy
- Radiographs?
- ? Steroids and NSAIDS
  Step down dose 50/40/30/20/10 mg over 5 days
  Oral ibuprofen 800mgs 6 hourly
  CHECK MH
- Refer or get advice
- Use TrigeminalNerve.org.uk website
Ultrasound? MRI?

- Better to modify technique and prevent injury!

High-Resolution Magnetic Resonance Imaging
lingual nerve
We can't fix nerve injuries! We can only reverse them early on!

**Wait for resolution**
- Lingual nerve injuries related to LINGUAL ACCESS third molar surgery
- LA
- Trauma
- Orthognathic

**URGENT treatment < 30 hours**
- Suspected nerve trauma
- Inferior alveolar nerve injuries related to third molar surgery
- Implants
- Endodontics

Acknowledge problem (home check)
Seek advice
You MUST reassure your patient but don’t give them false expectations!
Medication and REFERRAL
<table>
<thead>
<tr>
<th>Mechanism</th>
<th>Duration</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Known/suspected nerve section</td>
<td></td>
<td>Immediate exploration</td>
</tr>
<tr>
<td>TMS IANI – retained roots</td>
<td>&lt;30 hours</td>
<td>Immediate exploration</td>
</tr>
<tr>
<td>Implant</td>
<td>&lt;30 hours</td>
<td>Remove implant</td>
</tr>
<tr>
<td>Endodontic</td>
<td>&lt;30 hours</td>
<td>Remove tooth / overfill</td>
</tr>
<tr>
<td>Implant / Endodontic</td>
<td>&gt;30 hours</td>
<td>Treat therapeutically</td>
</tr>
<tr>
<td>TMS IANI – large neuropathic area, pain and disability</td>
<td>&lt;3 months</td>
<td>Consider exploration</td>
</tr>
<tr>
<td>TMS LNI – large neuropathic area, pain and disability</td>
<td>&lt;3 months</td>
<td>Consider exploration</td>
</tr>
<tr>
<td>TMS IANI –</td>
<td>&gt;6 month</td>
<td>Treat therapeutically</td>
</tr>
<tr>
<td>TMS LNI –</td>
<td>&gt;6 month</td>
<td>Treat therapeutically</td>
</tr>
<tr>
<td>LA, fracture, orthognathic</td>
<td>&gt;6 month</td>
<td>Treat therapeutically</td>
</tr>
</tbody>
</table>
Nerve injuries best prevented!
Prevention of nerve injury

Risk assessment
Prevention of nerve injury

Risk assessment
Lingual nerve exploration
Lingual nerve exploration
Key messages...
changing practice

• We can prevent most of these nerve injuries
• We cannot ‘fix’ patients with these nerve injuries
• We can improve informed consent –

Hyperaesthesia and pain are more likely than numbness

• Lingual nerve / inferior alveolar nerve injuries are NOT mainly temporary? **DO NOT SIT AND WAIT** for resolution
• Home check will facilitate timely urgent intervention
Thank you
http://trigeminalnerve.org.uk

Zehra Yilmaz