

# Iatrogenic effects of orthodontics

## Extraoral damage

Shivani Patel looks at extraoral dangers, in the concluding part of her series on the risks for patients receiving orthodontic treatment, primarily from fixed braces

**A**lthough orthodontic treatment has recognised benefits, including improvements in dental health, function, appearance and self esteem, orthodontic appliances can cause harm. The decision whether to proceed with orthodontics requires comparison of the potential risks with the benefits<sup>1</sup>.

### 1) TMJ

**Temporomandibular joint disorder (TMJD)** is common in adult patients and its aetiology is multifactorial. Some malocclusions may predispose to TMJD such as anterior open bites, increased overjets and crossbites (weak correlation)<sup>2</sup>. However, studies investigating the relationship between temporomandibular disorders and orthodontic treatment have found no association between the two<sup>3-5</sup>.

If TMJD develops during treatment then stop all elastic band and headgear wear. You may want to provide a soft occlusal splint and ask the patient to avoid eating hard and sticky food. Also advise the patient not to open their mouth wide and take analgesics along with hot/cold compressions.

Always take a thorough medical and dental history. Clinical examinations should involve checking the TMJ on opening and closing the mouth. Feel and look for any displacements/ deviations, clicking and grinding, and look at the condyles on an OPG X-ray.

Some orthodontists believe that the aims of treatment to prevent TMJD should be to:

EXTRAORAL EFFECTS	
TMJ	TMJD
<b>Soft tissues</b>	<b>Headgear induced trauma</b> <b>Burns</b> <b>Allergies</b>
<b>Systemic effects</b>	<b>Allergy/sensitivity</b> <b>Cytotoxicity</b> <b>Bacterial endocarditis</b> <b>Cross infection</b> <b>Risks from radiation</b>
<b>Other effects</b>	<b>Psychological</b> <b>Failed treatment</b> <b>Unwanted effects from treatment</b>

- Create a flat occlusal plane
- Class I buccal segments
- Group function/canine guidance on lateral excursions
- Correct molar torque
- Coordinate arch widths.

Advise patients seeking treatment for such disorder that there may not be an improvement with orthodontics.

### 2) Soft tissues

**Headgear** is commonly used for reinforcing anchorage and also traction in growing patients. Nowadays, this has been superseded by temporary anchorage devices (TADS). There is a very small risk of injuries associated with headgear; however, these can have a very serious outcome and have to be used with caution. Common injuries are seen to the eyes and skin. Causes of headgear-induced trauma, according to Samuels and Wilner (1996)<sup>6</sup>, include:

- Accidental disengagement - 17% of injury caused whilst playing with headgear on
- Incorrect handling - 8% whilst

removing and fitting

- Deliberate disengagement - 14% by another child
  - Unintentional disengagement - 71% especially at night time.
- Methods of prevention, include:
- Safety glasses during fitting and adjustment
  - Careful adjustment to maintain good fit
  - Use of safety products - straps, snap release, safety-shielded face bow (recurved), self locking (Nitom)
  - Clear instructions to patients - seek ophthalmic opinion if trauma occurs to eyes
  - Follow the guidelines issued by the British Orthodontic Society (BOS) on the use of headgear.

**Burns** are uncommon, but can be caused by chemical agents such as acid etch, thermal overheating of handpieces and electrothermal debonding (rarely used). Careful operation can help prevent this danger.

**Allergies** are also an extraoral effect that may occur during orthodontic treatment, with 3% of patients claiming to have rashes caused by their appliance. Nickel, headgear straps and latex have all been reported to cause allergies. The use of elastics and latex gloves can cause Type I anaphylaxis in patients allergic to the material, but can also be easily prevented by using latex-free supplies. Another, but very rare, reported allergy is that to bonding agents. These dangers can all be reduced by taking a thorough medical history of the patient and taping around areas of exposure to headgear parts.

### 3) Systemic effects of treatment

**Allergies** are usually to nickel, latex and bonding agents and have been discussed above.

**Bacterial endocarditis** was previously prevented by antibiotic prophylaxis that was given to patients at risk for procedures such as extractions and placement of separators<sup>7</sup>. However, the



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Inappropriate surgical technique has left this patient with an unaesthetically widened nasal alar base

#### RISK CHECK

- Is orthodontic treatment necessary?
- Will the treatment improve the patient's function, dental health, aesthetic and psychological well being?
- Does the patient want orthodontic treatment?
- Does the patient understand what is involved?
- Is the treatment within my competence?
- Do I have a good success rate?

NICE guidelines now recommend that healthcare professionals should identify adults and children with structural defects as being at risk<sup>8</sup>. These defects include:

- Valve replacement
- Congenital heart disease
- Previous endocarditis
- Hypertrophic cardiomyopathy
- Acquired valvular heart disease.

Preventive advice should be given, such as the importance of maintaining good oral health. Antibiotic prophylaxis and chlorhexidine mouthwash are not recommended for people undergoing dental procedures.

**Cross infection** can be carried from:

- Operator to patient
- Patient to operator
- Patient to patient
- Operator/patient to a third party.

Taking a thorough medical history and identifying 'at risk' patients can help prevent cross infection. Proper sterilisation and disinfection, universal precautions and following guidelines set by the CQC will also reduce this risk. Making sure that safety glasses, gloves and facemasks are worn during all appropriate times, as well as ensuring that clinical members have up-to-date hepatitis B vaccinations, will contribute to prevention.

**Radiation** exposure from radiographs is a major concern from any dental treatment. The National Radiological Protection Board states that there is a lot of unnecessary radiation from diagnostic radiographs<sup>9</sup>. In the UK, 100-250 cancer fatalities are caused by radiographs and 25% of these

radiographs are dental.

Medical risks from the direct exposure of radiation will cause degeneration of cells or cell death, and indirect effects result in damage to the blood supply. There are also constitutional effects of exposure that may induce malaise, nausea and vomiting. Neoplastic change can cause serious damage, such as sarcomas and leukemia, and there has been evidence of genetic effects when radiation-overexposed patients have passed on their medical condition to offspring. Preventive tactics, include:

- Taking radiographs only when clinically justified
- Use collimation
- Filtration of the beam
- Fast films
- Quality control
- Regulation of voltage - ideal 60kV.

#### 4) Other effects

**Failed treatment** counts for 4-23% of orthodontic treatments<sup>10</sup>. This can be due to patient non-compliance or incorrect diagnosis and management. Some of the negative effects of this could be residual spacing, malalignment, residual overjet, crossbite or relapse.

Ellis and Benson (2002) have suggested that it is very essential that clinicians should establish with all patients prior to embarking on treatment, that they understand their commitment to lengthy treatment times - 18-24 months and prolonged retention<sup>11</sup>. It is important that before embarking on any treatment that good records are taken and

benefits outweigh the risks and, of course, all clinicians must recognise their own limitations.

**Unwanted effects** can be minimised by all orthodontists considering the dentofacial appearance, as it influences treatment aims and planning. They should also think about the profile, symmetry, lip support and smile line. Inappropriate extractions and treatment planning, such as camouflaging a skeletal discrepancy, require surgical correction. Risks from oral and orthognathic surgery are:

- Pain, swelling, infection
- Paraesthesia of the inferior dental nerve
- Inappropriate surgical movements
- Psychological problems
- Damage to the adjacent teeth, bones and gingivae/soft tissues.

#### Risk versus benefits

If treatment is to be of benefit to the patient, the advantage it offers should outweigh any possible damage it may cause<sup>12</sup>. Justification of treatment requires improvement in function, dental health, aesthetic and psychological well being. Thus, treatment should be of the highest standard possible and commonly requires that it be given by individuals with extended training in diagnosis and technique.

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