



Malocclusion –Who? What? Where? When? Why?

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1

Malocclusion

Houston:
“an appreciable deviation from the ideal occlusion that may be considered aesthetically or functionally unsatisfactory”

- “Ideal” occlusion is rare
- Malocclusion is not a disease state but is regarded as a deviation from normal

2

Why do we treat malocclusion?

- dentofacial appearance**
 - psychosocial benefits
 - Shaw (1980) – dentofacial appearance frequent source of teasing
- occlusal function**
 - Crossbites and TMJ
 - Open Bites / Class III and eating/speech
- damage to periodontium and teeth**
 - Traumatic overbites
 - Ectopic canines
 - Incisor trauma

3

Table 1 Features children most dislike or are teased about (Shaw *et al.*¹)

Feature	Disliked appearance or teased (%)
Teeth	60.7
Clothes	53.8
Ears	51.7
Weight	41.5
Brace	33.3
Nose	29.3
Height	25.3

Shaw *et al.*, 1980 from D. Roberts-Harry and J. Sandy, British Dental Journal (2003)

9

WHO SHOULD RECEIVE TREATMENT?

- Controversial
- Various indices have been developed
- Index of Orthodontic Treatment Need
 - Aesthetic component
 - Dental Health component

11

Occlusal indices

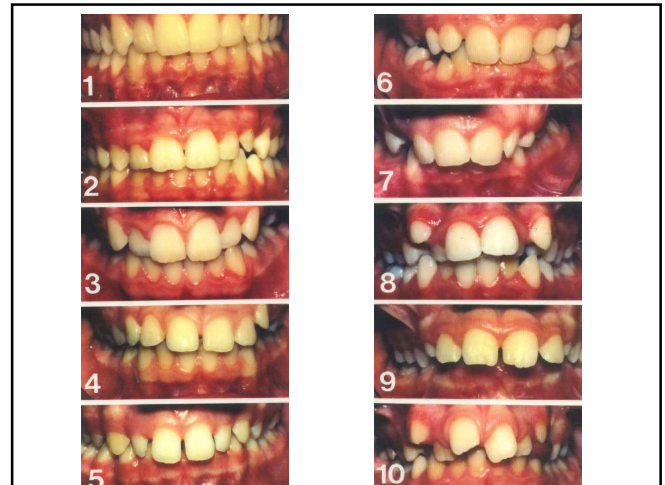
- IOTN Index of Orthodontic Treatment Need
- PAR
- Peer Assessment Rating
- Epidemiology
- Treatment priority & resource allocation
- Auditing treatment outcome
- Research

12

Index of Orthodontic Treatment Need (IOTN)

- AESTHETIC COMPONENT
 - 10 point scale
 - standardised series of photographs
- DENTAL HEALTH COMPONENT
 - 5 point scale (4-5 need treatment)
 - most severe abnormal occlusal features
 - missing and unerupted teeth, overjet, crossbites, crowding, overbite

13



14

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The Aesthetic Component of the Index of Orthodontic Treatment Need validated against lay opinion

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- Professional: 1-4 = no treatment need
- Lay people: 1-3 = no treatment need (Hunt et al., 2002)

15

WHAT TO LOOK FOR – common problems

- INCISORS
 - Prominent upper teeth (increased overjet)
 - Prominent lower teeth (Class III incisors)
 - Deep overbite
- ARCH ALIGNMENT
 - Crossbites
 - Crowding
 - Early loss of deciduous teeth
 - Carious first molars

16

WHAT TO LOOK FOR – less common but important

- Ectopic maxillary canines
- Supernumerary teeth with delayed eruption of incisors
- Congenitally absent teeth
- Early loss of incisors (trauma)
- Impaction of 6s

17

Increased overjet: what is significant?

- Overjet > 6mm (IOTN 4a – “great need”)
- Appearance
- Trauma
 - Risk age 8-10, particularly in boys
 - Wong & Kolokotsa, 2004 - average direct and indirect cost of treating a child or adolescent with a traumatic injury to their incisors was £856

Table 2 Relation between size of overjet and prevalence of traumatised anterior teeth

Overjet (mm)	Incidence %
5	22
9	24
> 9	44

from D. Roberts-Harry and J. Sandy, British Dental Journal (2003)

19



20

Traumatic loss of permanent upper incisors

- Overjet & poor lower lip coverage
- Try to save if at all possible (RCT, re-implant)
- Options if lost or unsalvageable
 - Maintain space with prosthesis
 - Close space orthodontically and crown lateral

21

Increased overjet: at what age should we treat?

- Bauss et al., 2004
 - 10% of orthodontic patients (11-15) previous upper incisor trauma
 - increased overjet
- "preventive orthodontic treatment of such patients should be initiated and completed before the age of 11"

22

Increased overjet: at what age should we treat?

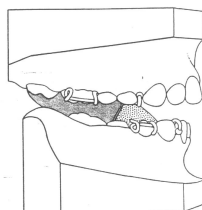
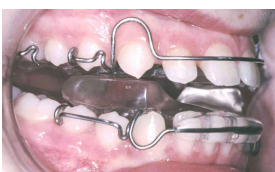
Incisor trauma and early treatment for Class II Division 1 malocclusion

Lorne D. Koroluk, DMD, MSD, MS, FRCD(C),^a J. F. Camilla Tulloch, BDS, FDS,^b and Ceib Phillips, PhD^b
Chapel Hill, NC

- 1/3 of children prior to dental age 9 had trauma
- "orthodontic intervention aimed at reducing trauma should begin very soon after the eruption of the maxillary incisors"

23

Twin Block Appliance



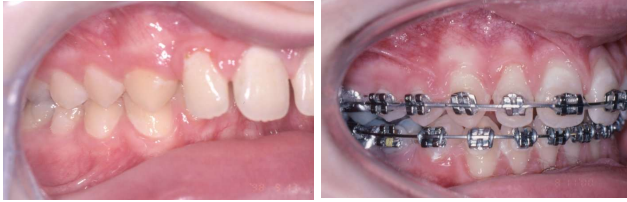
24

Bionator Appliance



25

Functional Appliance prior to Fixed Appliances



Before functional

After functional

26

Increased overjet: at what age should you refer?

- before age 10
 - may reduce likelihood of trauma although the evidence for this is weak
 - may prolong total treatment if fixed appliances also required
 - Psychosocial benefits if teasing is a problem
 - Usually a preliminary phase of functional appliance
- Age 10-12
 - Permanent dentition established
 - Suitable for fixed appliance treatment

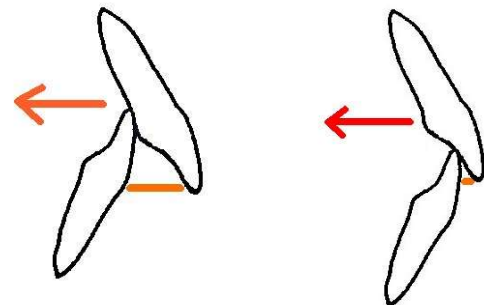
27

Treatment of increased overbite: Why?

- Allow overjet reduction
- Improve post-treatment stability
- Facilitate restorative treatment
- overbite $> \text{ or } = 6 \text{ mm}$ associated with periodontal bone loss
 - (Bjornaas et al., 1994)

33

Increased Overbite & Overjet Reduction



Increased overbite prevents full overjet reduction

Normal overbite allows full overjet reduction

36

Increased Overbite - growing patients

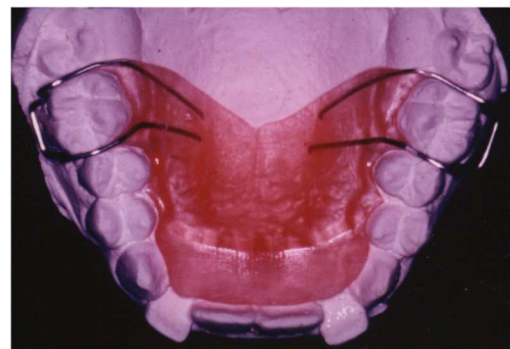
Anterior Biteplane

Functional Appliances

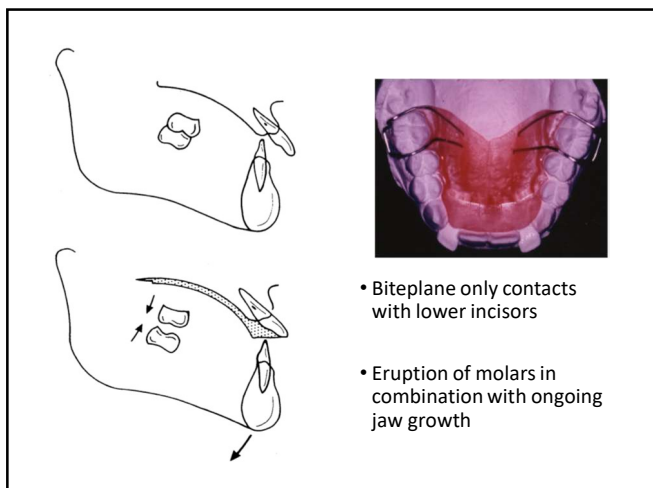
Fixed appliances

37

Anterior biteplane



38



39

Increased overbite - non-growing patients

Orthognathic surgery often required

Therefore refer deep overbite patients early (at age 10-11)

40

Class III treatment

Upper removable appliances (procline upper incisors)

Fixed appliances (reduce crowding, retrocline lower incisors)

Orthognathic surgery (correct skeletal problems)

46

Class III: Timing of Treatment

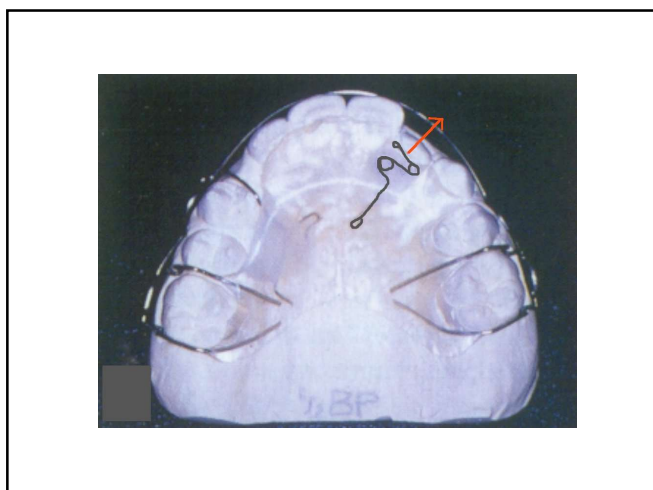
Growth unfavourable and lasts longer

Treat displacements early with URA

Comprehensive treatment usually carried later than in other types of malocclusion

Severe upper arch crowding may require earlier treatment for psychological reasons

47



48

Crossbites

buccal cusps of the lower teeth occlude lateral to the buccal cusps of the upper teeth.

10% of orthodontic patients

Unilateral crossbite – with/without displacement

Bilateral crossbite

52

Which Crossbites should we treat and why?

Only unilateral crossbites with displacement

Prophylactic measure to prevent future TMJ dysfunction

- Likelihood is low however

To allow normal occlusal development & facilitate later treatment

54

Expansion screw



55

Quadhelix



56

What age to treat or refer?

Ideally in deciduous dentition

- 20% correct spontaneously
- patient compliance may be poor

Mixed dentition

- Before eruption of premolars and canines
- Better compliance

58

Ectopic canines

- Low prevalence but high in risk for dentists

- Prevalence 2%
- 85% palatal
- 15% buccal



59

The Problem



1 in 10 patients with canine ectopia

60

Palpate at
10-11 years

**What
should you
do?**

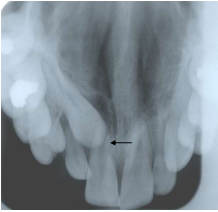


61

Canine not palpable?

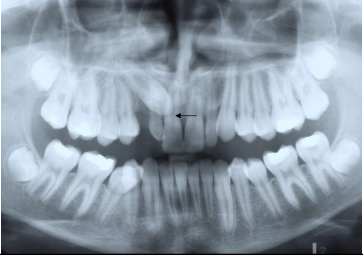
Horizontal parallax • Anterior Occlusal & IOPA • Two IOPAs	Vertical parallax • Anterior Occlusal & OPT • IOPA & OPT
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62



**Vertical
parallax**

↑

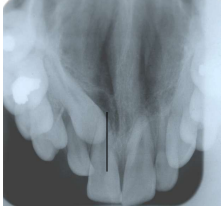


Tube movement

63



IOPA



Anterior Occlusal

←

Tube movement

64

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Localizing ectopic maxillary canines—horizontal or vertical parallax?

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- Horizontal parallax is superior to vertical parallax for diagnostic accuracy
- Diagnostic sensitivity for palatal canines 69% v 88%

65

Extraction of the deciduous canine

**46 palatally
ectopic
canines**



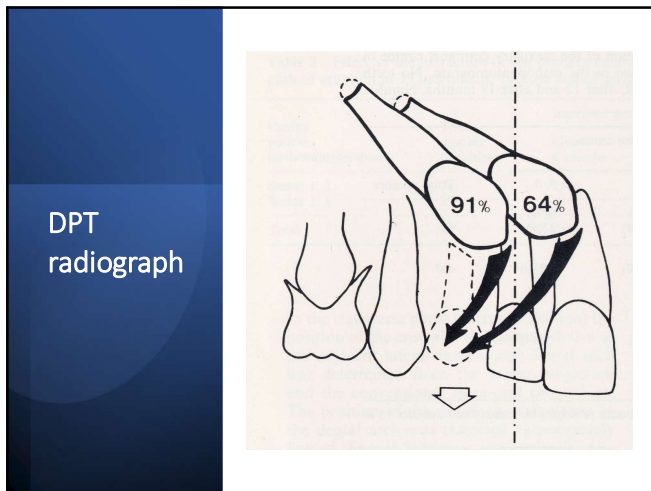
**Age 10 - 11
12 months**

**36 (78%)
self-corrected**



Ericson & Kurol, 1988

66



67

Surgical exposure and orthodontic alignment

- Willing to wear fixed appliances
- Well motivated & good dental health
- Unsuitable for interceptive treatment
- Degree of malposition not too great

68

Brin, Becker & Shavlav, 1986

- 2,500 patients with ectopic canines
- 43% had absent or small lateral incisors

69

Crowding

- Large teeth
- Small jaws
- Extra teeth
- Space loss – early loss of deciduous teeth

70

Need for treatment of crowding?

- Most common occlusal trait
- Weak evidence of association with periodontal disease
- Regarded as unattractive
- IOTN 4 – contact point discrepancies > 4mm
- IOTN 5 - 4mm or less available for a tooth (impacted)

71

Table 1 Relationship between crowding and extractions

Degree of crowding	Need for extractions
< 5 mm	No
5–10 mm	Possibly
> 10 mm	Yes

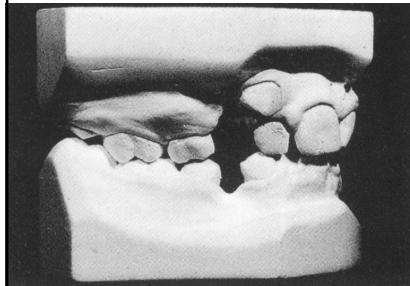
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Crowding: at what age should you refer?

- age 10
- Before eruption of the permanent canines
- Allows consideration of interceptive treatments

76

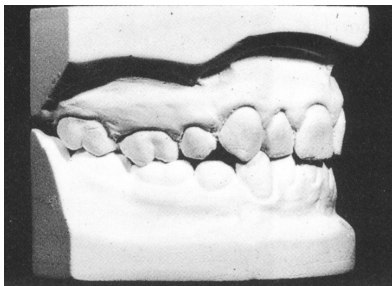
Extraction of Upper 4s: Interceptive Treatment



- Buccally crowded upper canines
- Extract upper 4s as canines erupt
- May need space maintaining appliance

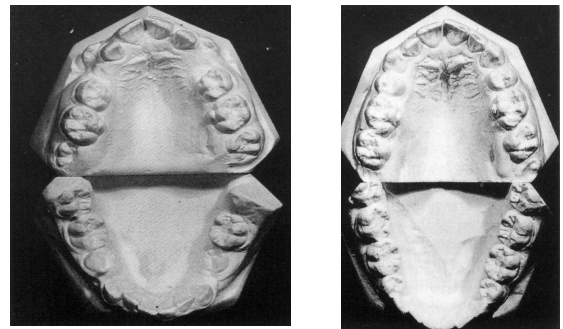
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Extraction of Upper 4s: Interceptive Treatment



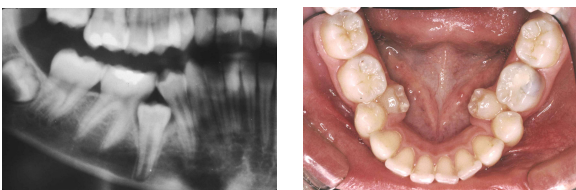
78

Extraction of Upper 4s: Interceptive Treatment



79

Early Loss of Deciduous Teeth



80

Early Loss of Upper E



81

Early Loss of Deciduous Teeth

- Tooth lost
 - D, E space loss as 1st permanent molars drift mesially (premolar crowding)
 - C incisor midline shift as permanent incisors drift into space
 - A, B minimal effect
- Earlier loss → more severe
- Crowded arch → more severe

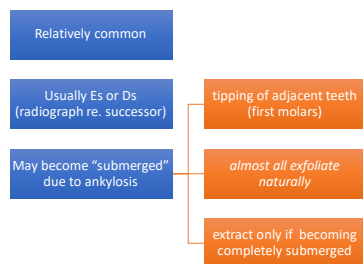
82

Prolonged Retention of Deciduous Teeth



85

Prolonged Retention of Deciduous Teeth



86

Supernumerary Teeth (\$)

Incidence 1-2%

80% are in the anterior maxilla

- OPG
- anterior occlusal

Clinical Effects

- delayed eruption of teeth (e.g. Upper centrals)
- may erupt (mesiodens), crowding
- midline diastema (mesiodens)

87



88



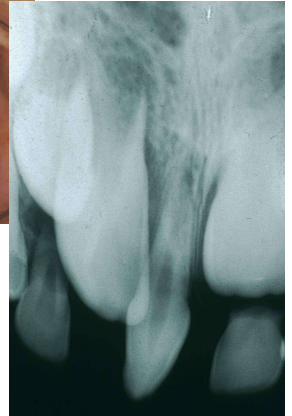
89



90



Erupted anterior conical supernumerary



Courtesy of Mr N McGuinness

91

Supernumerary teeth: treatment options

No treatment

Extract if impeding eruption or causing crowding

Exposure and alignment of teeth with delayed eruption (Upper incisors)

- However, more than 70% of unerupted upper central incisors will erupt following removal of a supernumerary tooth

92

Abnormal Tooth Form

- Dilaceration of permanent upper incisors
 - root bent
 - trauma to deciduous predecessor, age 4-5
 - delayed or non-eruption
 - orthodontic alignment sometimes possible
- Peg shaped upper lateral incisors
 - strong association with ectopic canines
 - other lateral may be absent



Dilaceration



93

Dilaceration UR1



94

Developmental Absence of Permanent Teeth



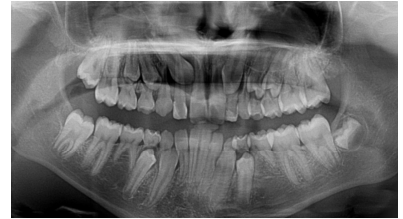
95

Developmental Absence of Permanent Teeth (Hypodontia)

- Relatively common (2-3%)
 - excluding 3rd molars, most common absent teeth are upper laterals, 2nd premolars and lower central incisors
- Treatment
 - space closure
 - bridgework
 - accept (e.g. lower 5s)
- If Ortho treatment required to optimise space for restorative treatment (or close spaces) then IOTN DHC will be 4 or 5

96

Developmental Absence of Permanent Teeth (Hypodontia)



97

Impacted Teeth

First permanent
molars

Premolars

Third molars

100

Impacted 1st Molar



101

Impacted Teeth: Perm First Molars

Incidence: 3-4%

almost always in the maxilla

two thirds will correct spontaneously, although unlikely to improve after age 8 years.

May require

- extraction of E
- Simple URA to disimpact

102

Impacted Teeth: Premolars



103

Impacted Teeth: Premolars

- Usually 2nd premolars
- Early loss of E
- Treatment
 - Extract 4 to allow eruption of 5
 - Extract 7 and distalise 6 to create space
 - Extract 5 (surgical)
 - No treatment and review regularly
- Will score IOTN DHC 5

104

Early loss of Permanent Teeth

1st molars
(caries)

Upper incisors
(trauma)

105

Early loss of Permanent 1st Molars



106



107

Early loss of Permanent 1st Molars

- Why is it a problem?
 - Residual space
 - overeruption of opposing first molar
 - space is difficult to use with appliances for treating anterior crowding or overjet
- Ideal age for spontaneous closure is 8-9 years
- Upper spaces close better than lower
- Unopposed upper 6s overerupt
- Midline shift with unilateral loss is minimal

108

Management of Carious 1st Molars

- Extraction best age 8-9, if 6s are of poor prognosis at this age then consider extraction
- Later extraction --> tipping
- Consider extraction of upper with lower



109

What are the take-home messages?

- INCISORS
 - Refer increased overjets and overbites at age 10-11
- ARCH ALIGNMENT
 - Refer or treat crossbites early to eliminate displacements
- UPPER CANINES
 - Palpate at age 10 – parallax views if not palpable
 - Beware if small upper laterals
- DELAYED UPPER INCISOR(S) - ASYMMETRY
 - Radiograph to check for supernumeraries

110

Benefits of orthodontics

- Caries and periodontal benefits inconclusive
- TMJ
- Trauma
- Resorption of teeth
- Psychosocial benefits difficult to measure but have been shown in surgical cases and are likely to be important.
- Best scenario = more severe problems + trained specialist

111