Introduction

The first permanent molars (FPM) have a very high caries rate

- In the UK: 46-48%
- In the US (1980's): 50-60%
- In China (2008): 41%
- In Brazil: 40%

Hypoplastic & Hypomineralized FPM

- Frequently seen in children
- 18-19% of 7 to 13 year olds have at least one hypoplastic molar.

Hypomineralized FPM have:
- Normal morphological outline but may have reduced radiographic enamel opacity (similar to dentin)
- Developmental opacities – white to yellow brown defects
Hypoplastic & Hypomineralized FPM

- Associated frequently with incisors
- The more severe the molar defect, the more likely the contralateral molar & incisor will be affected as well

Calcification of first permanent molars begins at birth and the crown is form between 2.5 and 3 years of age
- Any local, systemic or genetic disruption during this development period has the potential to cause enamel defects
- Exact cause of molar defects is unclear
- Most studies rely on parental recall of medical & dental issues in the first 3 years of life
- Etiology is complex


Local factors:
- Trauma or infection of a primary predecessor
- Trauma due to extraction of primary predecessor
- Repaired cleft lip & palate

Genetic factors:
- Amelogenesis imperfecta

Vary in size, shape and in the location of their enamel defects
- More susceptible to dental caries
- More hypersensitive (chemical/thermal)
- Rapid wear, enamel loss, tooth loss
- Defects may lead to acute or irreversible pulps & pain

Ideal restorative treatment objectives are:
- To restore lost or weakened tooth structure
- Alleviate pain or sensitivity
- Maintain occlusion

In many cases, conventional cavity preparations (composite resins and amalgam) are impossible or have high failure rates.

Systemic factors:
- Premature birth or very low birth weight
- Antenatal or neonatal infection
- Nutritional deficiencies
- Radiation therapy
- Ingestion of excess fluoride
- Vit. D dependent rickets
- Neurological deficiencies

Vary in size, shape and in the location of their enamel defects

Milder than mild

mild moderate severe

Studies on the mechanical properties of enamel show significantly less hardness and modulus of elasticity of hypomineralized enamel than unaffected areas of the same tooth.


Until a permanent crown can be placed, the treatment of choice for moderate to severe defects is the stainless steel crown because it can be durable and reliable for many years.

Endodontic treatment of first permanent molars in children from 8 to 16 years have only a 36% success rate.


Failures & Consequences in Dental Treatment of FPM

Endodontic treatment of first permanent molars in children from 8 to 16 years have only a 36% success rate.

The survival rate of a full coverage crown for 10 years is about 95–98%.

On average every 10 years, the crown may need to be redone.

At times, the tooth requires extraction and prosthodontic replacement (e.g., implant or FPD) is required.

Bradbury AJ. A current view on patterns of extraction therapy in British Health Service Orthodontics. Br Dent J. 1985; 159:47-50

Costs and Benefits

Costs

As per BC Fee Guide:

Option 1: Restore and preserve at all costs: Total - $20-26,000
  - SSC x 4 = $300 x 4 = $1200
  - FCG x 4 = $1200 x 4 = $4800
  - PFM x 4 = $1500 x 4 = $6000
  - Endo x 4 = $1000 to $1500 = $4-6000
  - Post & Core = $250 x 4 = $1000
  - Future extraction of 4 impacted third molars = $2-4000
  - Orthodontic treatment = $7-8000

Option 2: Extract 4 compromised FPM: Total - $8-9200
  - Extraction of 4 permanent first molars = $1200
  - Orthodontic treatment = $7-8000

Conventional Orthodontic Approach

Few definitive papers exist to guide a dentist when to restore or extract FPM.

Extraction treatment plan must also include a plan to close the extraction space.

Most orthodontists "shy away" from treatment plans involving extraction of FPM.

Thus, "conservative" decisions are usually made (e.g., restore & "preserve teeth in the mouth").

Conventional Orthodontic Approach

"Extraction of the first permanent molars is rarely the orthodontic extraction of choice."

"It doubles the treatment time and halves the prognosis."

"As a general rule, the first permanent molar should be restored."


Management of FPM Spaces

"OK, we restored the teeth but it didn't work. Now, we have to extract."
- Inadequate tooth structure remains for restoration.
- At times when infection cannot be arrested, pathologic root resorption occurs.
- Bony support cannot be regained post extraction and uprighting.

Case 1 - Late extractions of restored & failed FPM with immediate space management

5 years!

Case 2 - Late extraction of FPM without immediate space management

5 years!
Thus, restoration “at all cost” may not always be the best option.

“So, when should one consider the early extraction of FPM?”

Prior to Extracting...
- Take a good quality panoramic radiograph (especially prior to dental treatment under GA)
- Temporize the tooth if necessary
- Obtain an orthodontic opinion with an orthodontist who will be responsible for future treatment

Factors Influencing Decision to Early Extract FPM
- Poor long term prognosis (extent of caries, pulpal involvement)
- Number of other carious teeth
- Status of oral health & motivation towards dental health
- Will patient require orthodontic treatment in the future?
- Motivation toward orthodontic treatment

Conventional Ideal Conditions for the Early Extraction of FPM
- No congenitally missing teeth
- Unerupted canines, premolars, second molars are visible on radiograph and show no evidence of abnormality
- Class I occlusal relationship
- Minimal buccal segment crowding
- Roots of second permanent molars have not formed

Case 1 – Class I malocclusion, normal angle: Exo of 4 FPM with 8’s present
Case 1

2.5 yrs post-extraction

3.5 yrs post-extraction

4.5 yrs post-extraction

1.5 yrs post-extraction

2.5 yrs post-extraction

3.5 yrs post-extraction

4 yrs post-extraction

4.5 yrs post-extraction
Third Molar Considerations & The Shortened Dental Arch

- No clinical significant differences between subjects with shortened dental arches of less than 10 occlusal pairs and complete dental arches (masticatory ability, TMD signs & symptoms, periodontal support, oral comfort, migration of teeth)

- Shortened dental arch (anteriors and premolars) fulfilled the requirements of a functional dentition


Third Molar Considerations & The Shortened Dental Arch

"Occlusal stability is determined by a number of factors, including periodontal support, the number of teeth in the dental arches, the interdental spacing, occlusal contacts, and tooth wear."


Third Molar Considerations & the Shortened Dental Arch

"In this 9 year follow-up, subjects with shortened dental arch had similar prevalence, severity, and fluctuation of signs and symptoms related to TMD as compared to subjects with complete dental arches"


Third Molar Considerations & The Shortened Dental Arch

"The World Health Organization goal for the year 2000, namely to maintain a natural dentition of not less than 20 teeth throughout life, is substantiated by the current literature review as this proposed dentition will assure an acceptable level of oral function."


Case 2. Age 7 – Class I malocclusion, normal angle. Exo of 4 FPM w/ 3 congenitally missing E4.
Should Crowding Influence the Decision to Extract Compromised FPM??

Two carious FPM

Three carious FPM

One carious FPM

Case 1 – Class I malocclusion, high angle. Early exo of 6’s with severe anterior crowding
Case 2 – Class II, flat profile. Early exo of 6’s with severe anterior crowding and taurodontism.

2 yrs post-extraction

3 yrs post-extraction

4 yrs post-extraction

4.5 yrs post-extraction pre-orthodontics

Post-Orthodontics

Does not solve anterior crowding!
Case 3 - Class II: Early exo of 6's with severe anterior crowding and bimaxillary protrusion with lip incompetence.

1.5 yrs post-extraction

2.5 yrs post-extraction, with developing third molars

4 yrs post-extraction

Does not solve anterior crowding!

Case 4 - Class III: Early exo of 6's with anterior crowding

1 yr post-extraction
Case 5– Class II: Early exo of 8’s with anterior crowding, impacted #13
Midline Considerations in the Early Extractions of Compromised FPM

51 subjects with unilateral early FPM loss

- Unilateral FPM extractions caused dental midline deviations in both arches. Especially in the mandibular arch
- Unilateral FPM extractions can result in "remarkable" skeletal asymmetry

"Lack of opposing teeth extractions can cause more harm than extracting all four teeth."

"Extraction of decayed teeth promotes an improvement of the overall periodontal condition and reduction of the decay incidence."

Case 1: Class II, anterior crowding: Asymmetric exo of right FPM

Case 1- Class II, anterior crowding: Asymmetric exo of right FPM

Case 1

Case 2- Class I with asymmetric extraction of right FPM

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Tipping vs. Bodily Drifting: A Complication Resulting From the Early Extraction of Compromised FPM

Case 1: Class I where the mandibular 7’s did not bodily drift, despite early extraction of FPM.
Other applications?

Similar Circumstances:
Hypoplastic/canineous maxillary second molars
Summary

• First permanent molars are rarely the choice of extractions in conventional orthodontic treatment planning.
• But ultimately, the decision to extract may not be an orthodontic one but a restorative one.
• Restoration at all costs may not be the best option.

Summary

Prior to extensive restoration (or repair of an existing restoration) of a compromised FPM in a child who is less than 8 to 10 years of age, consider the option of EARLY extraction of those FPM with poor long-term prognoses.

Summary

Although comprehensive active orthodontics may not be started until years later, an early orthodontic consultation can provide case specific recommendations.
Timely extractions can facilitate future fixed appliance mechanics and influence the quality of treatment results.

Thank You!

Questions and Answers