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Orthodontic management of Class I malocclusion with severe crowding by extraction of four premolars: A case report

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ABSTRACT

Introduction : *Patients may seek orthodontic treatment for a variety of reasons, such as dental crowding, which can be associated to the dental arch's length and width, the mesio-distal tooth's diameter, and the proportions of the teeth.* ***Case Report :*** *An 11 year old girl Samriddhi Awasthi, came to the department of Orthodontics & Dentofacial Orthopaedics with the chief complaint of irregular teeth.* ***Diagnosis :*** *The intraoral & extraoral inspection observed competent lips, convex profile with severe crowding.* ***Treatment:*** *The orthodontic treatment to follow was all four 1st premolar extractions with the use of fixed appliances.* ***Results:*** *The objectives proposed in the treatment plan were satisfactorily corrected, such as severe dental crowding.* ***Conclusion:*** *Successful finishing of a case with well aligned upper& lower arches, obtained proper overjet and overbite and improved soft tissue profile. The results obtained in the present study highlight that premolar extractions are an adequate option in cases of severe dental crowding.*

Keywords: *dental crowding, premolar extraction, orthodontic treatment*

INTRODUCTION

The main goal of an Orthodontist is to achieve facial balance, and the development of Orthodontic treatment by the balance between aesthetic, treatment, functionality and patient's aspiration. Today, aesthetic procedures are a highly prevalent technique due to growing awareness of facial appearance. Since the anterior teeth show when one smiles, every orthodontic treatment must take great care to align the anterior teeth aesthetically. Most patients seek orthodontic treatment for any misalignment or irregularity in this region. The results of the process are primarily determined by the patient's age, desires, and the orthodontist's expertise, rather than the numerous techniques or treatment philosophies. Additionally, the types and degree of malocclusion must be considered.[1]

Crowding is one of the most frequent complications associated with all malocclusions. It mostly occurs due to the imbalance in the width and length of the dental arch, mesio-distal width of the teeth and the dental proportions. Age, the affected jaw, and the degree of crowding all influence the treatment option for crowding. Selecting an appropriate management strategy for each crowding case is crucial for achieving optimal results.[2,3]

CASE REPORT

CHIEF COMPLAINT

An 11- year-old girl Samriddhi Awasthi, came to the department of Orthodontics & Dentofacial Orthopaedics with the chief complaint of irregular teeth.

MEDICAL AND DENTAL HISTORY

No medical and dental history.

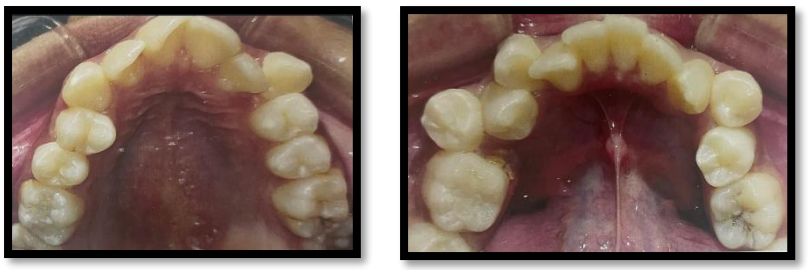
CLINICAL EXAMINATION

- **Extra-Oral Features**

  - Facial profile: Convex.
  - Facial Form: Mesoproscopic
  - Lips: Competent
  - Nasolabial angle: Acute
  - Mentolabial sulcus: Normal
  - Chin : Normal

- **Intraoral Features**

  - Soft tissues: Healthy Soft tissues found
  - Teeth present: Permanent
  - 17,16,15,14,13,12,11,21,22,23,24,25,26,27
  - 47,46,45,44,43,42,41,31,32,33,34,35,36,37
  - Maxillary & Mandibular Crowding Present
  - Molar Relationship- Angle's Class I bilaterally
  - Canine Relationship- Ricket's End on Relationship Bilaterally



SMILE ANALYSIS

- Type of Smile- Complex
- Smile Arc- Non-Consonant
- Smile Line- Average

RADIOGRAPHIC FEATURES

- No pathologies seen.
- Normal alveolar bone height.

CEPHALOMETRIC FEATURES

Parameters	Normal	Pre- Treatment Value	Post Treatment Value
Steiners'			
SNA	82	81	80
SNB	79	76	75
ANB	3	5	5
Interincisal angle	131	115	125
Upper Incisor to NA	25	31	20
Lower Incisor to NB	28	28	24
Tweed's			
FMA	24	28	25
FMIA	61	50	60
IMPA	95	102	100
WITS APPRAISAL	0.5-1	3mm AO ahead of BO	1mm AO ahead of BO
Bjork's			
Saddle Angle (N-S-Ar)	123+/- 5	123	123
Articular Angle (S-Ar-Gn)	143+/-6	143	142
Gonial Angle	130+/-7	123	124
Sum	396	389	389
Jarabak's Ratio	62-65%	71.1%	68.8%

DIAGNOSIS

It is a case of Skeletal Class II jaw bone relationship with Orthognathic Maxilla & Retrognathic Mandible with crowding in upper & lower dental arch with Horizontal Growth Pattern & Angle' Molar Class I relationship bilaterally.

TREATMENT OBJECTIVES

1. To correct Maxillary & Mandibular Crowding

2. To camouflage Skeletal Class II Relationship
3. To maintain Class I molar relationship
4. To achieve Class I canine relationship

TREATMENT PLAN

Fixed Mechanotherapy with extraction of 14,24,34 & 44

STAGES OF TREATMENT PROGRESS

Following extraction of all four 1st premolars, treatment was carried out in the following phases :

- Leveling and Alignment
- Space Closure
- Finishing and Settling
- Retention

Levelling and Alignment

1. Bonding done with MBT brackets(0.022 slot) till 2nd premolars in upper & lower arch.
2. Banding done wrt 16,26,36,46.
3. Transpalatal arch in maxilla and lingual arch in mandible were given for antero-posterior anchorage control in maxillary and mandibular molars.
4. Lacebacks and Bendbacks were given for antero- posterior anchorage support during leveling and aligning.
5. Leveling & Aligning was done with the use of respective wires 0.012 Niti, 0.014 Niti, 0.016 Niti, 0.016 SS, 0.018 Niti, 0.018 SS, 0.017x 0.025 Niti, 0.017x 0.25 SS, 0.019x 0.025 Niti & 0.019 x 0.019 x 0.025 SS.
6. Leveling and alignment phase was completed in around 11 months.

Space Closure

Space closure was done by sliding mechanics with light forces by using active tiebacks using elastomeric modules.

7. Then we consolidated the upper and lower incisors and did retraction of canines using active tie back on 0.019 x 0.025 SS.
8. Canine retraction was done in around 6 months.
9. Then we placed a crimpable hook distal to lateral incisor and retraction of inciors was done using the same wire 0.019x 0.025SS.
10. Complete space closure was achieved by 10 months.

Finishing and settling

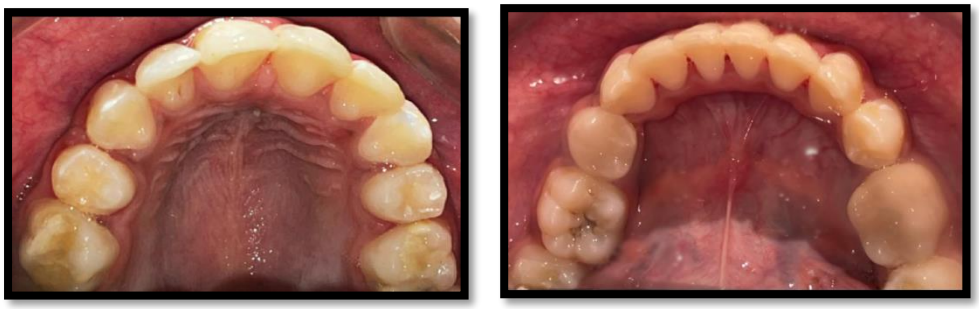
11. Class II elartics were given for 2-3 months for proper intercuspation.
12. Finshing & settling was done with 0.019x0.025 SS & 0.014 Niti wire.

Retention

13. Begg's Retainer in upper and lower was given to the patient for retention.

POST TREATMENT PHOTOGRAPHS

INTRAORAL PHOTOGRAPHS



EXTRAORAL PHOTOGRAPHS

POST TREATMENT OPG AND LATERAL CEPHALOGRAM

DISCUSSION

Crowding is one the most frequent malocclusions in orthodontics, with a strong hereditary tendency. Crowding refers to the discrepancy between the jaw size and tooth size that leads to derangement of the tooth row.

Anterior crowding is one of the reasons individuals begin orthodontic treatment. Dental arch length and width, mesio-distal tooth diameter, and tooth proportions are just a few of the numerous variables that affect anterior dental crowding. But incisor crowding is more than just a difference in dental arch size.[4]

Crowding may also be related to other factors such as incisor and molar inclination, early loss of deciduous molars, oral and perioral musculature, and the direction of mandibular growth.[5] When determining the cause of crowding in the dental arch, other factors were taken into account as well. It was found that crowded incisors in the permanent dentition are associated with a vertical or lingual inclination of the lower incisors in the mixed dentition.[6]

Malocclusions in skeletal Class I patients are frequently caused by poor relationships of the transverse or vertical arches, such as crowding and local pathologies, and are typically treated in the permanent dentition with extraction or non-extraction procedures. The question of whether or not extraction improve long-term outcomes remains a contentious aspect of the treatment approach.[7]

Orthodontics is used to treat crowded teeth after the necessary space has been gained for the teeth to be arranged. These procedures can be fixed with attachments bonded to the teeth

labially or lingually, or removable using conventional acrylic appliances or the more recent clear aligner technology. In orthodontics, the following techniques are used to create space so that crowding issues can be corrected. 1. Expansion of dental arch 2. Distallization the posterior teeth disintegration 3. Interproximal tooth reduction 4. Teeth extraction.[8]

The method used for space gain can be decided based on the cause of dental crowding and the severity of crowding. This clinical example aims to highlight the necessity of extractions due to severe crowding without compromising patient's function or aesthetics.

Anchorage preservation was done by TPA and lingual arch.

Space closure was done by sliding mechanics with light forces by using active tiebacks using elastomeric modules as in daily clinical practice, these are simple, economical and reliable. Placement is not difficult and can be delegated routinely, with few complications.[9]

CONCLUSION

Crowding is one the most frequent malocclusions in orthodontics, with a strong hereditary tendency. It is a sign of a lack of space in the arches & is not self-correcting, but can worsen over time. Our model analysis also showed excess tooth material compared to arches, so we went forward with all four 1st premolar extraction plan.

The treatment went successful without any hiccups & patient was satisfied with the result.

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