REVIEW

ISSN: 2456-8090 (online)
DOI: 10.26440/IHRJ/0408.11285

QR CODE

Current Trends in Orthodontics

ANINDITA MALLIK[1], YAGYESHWAR MALHOTRA*[2], AMITA BADHAN[3], PARUL UPPAL MALHOTRA[4], DEEPALI RASILA[5]

ABSTRACT

The scope for orthodontics increases as recent innovative ideas becomes successfully demonstrated and applied. The emphasis nowadays in on the holistic correction of the face rather than the dentition. In the field of orthodontics new innovations have not only increased the efficiency of an orthodontist to produce better results but at the same time, reduced the treatment duration, thus positively influencing the patient compliance. So it seems a win-win state for both the orthodontist and the patient. New solutions for the old problems have resulted in advancements in orthodontic materials and their cascading effect on appliance design and treatment strategies. This article briefly embraces us about the recent trends being followed by an orthodontist to achieve better results in shorter duration.

KEYWORDS: Orthodontics, Trends, Orthodontic Brackets

INTRODUCTION

Development is closely related with technology, which has widened the normal limits to human perception. "Paradigm shift" in the field more focuses on the soft tissue compared to the hard tissue. In this article we have broadly divided the recent trends into recent diagnostic aids, appliance design and the treatment strategies using accelerated orthodontics in adult patients.

ORTHODONTIC DIAGNOSTIC AIDS[1]

Cone Beam Computed Tomography (CBCT) in orthodontics: Allows for improved diagnosis and treatment planning in specific applications:

- Management of impacted teeth and dental anomalies
- Diagnosis and assessment of dentofacial deformities—especially skeletal asymmetry
- Pre-surgical planning for orthognathic procedures and miniscrew placement

3D photography: Creates three dimensional extraoral image of patient that can aid in diagnosis and treatment planning specially in patients with dentofacial deformities.

Digital Models: there are various methods that can be acquired by intraoral scan, CBCT, by scanning an impression or plaster model. They represent as an efficient alternative to the plaster models.

LASERS (Light Amplification by Stimulated Emission of Radiation) in orthodontics:[2-6] The most common lasers used in dentistry today are the CO_2 laser, the Nd:YAG laser, the erbium lasers (Er:YAG and Er,Cr:YSGG), and the diode laser. It has been seen CO_2 and Nd:YAG are not ideally suited for orthodontic applications. Erbium lasers are being extremely popular in dentistry today as they hold the singular distinction of being able to perform both hard and soft tissue procedures. But the diode laser seems to be most ideal for incorporation into the orthodontic specialty practice. Clinical application and classification of LASER is shown in figure. 1 and table 1.

RECENT ADVANCES IN APPLIANCES[1,7-9]

Recent trends in appliance are tabulated in figure 2 and are further discussed below:

Self-ligating brackets: These brackets are not new, but have gained popularity recently. They do not require an external auxiliary ties to ligate the arch wire into the bracket slot.

Customised appliances: Orthodontic appliances that are custom made to fit each individual patient's teeth, and designed to move teeth from their initial malocclusion to a pre-determined outcome.

Invisalign® is the first customized appliance

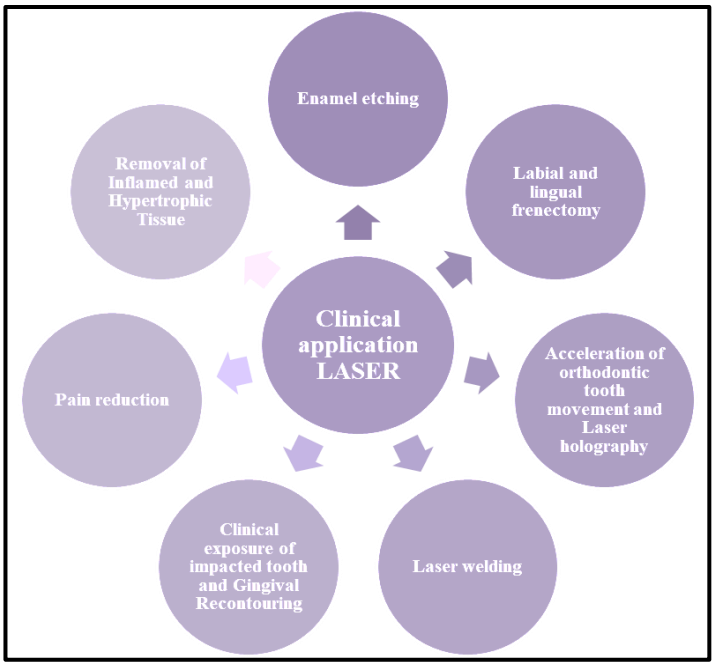

Figure 1. Clinical Application of Lasers

which uses a digital set up of the patient's teeth to plan the final outcome and for the fabrication of the appliance. Main advantage of this appliance is invisibility compared to the available brackets and it is easier to maintain oral hygiene.

CLASSIFICATION BASED ON USE:		
LASER TYPE	**WAVELENGTH**	**CLINICAL APPLICATION**
• Argon	• 488, 514 nm	• Curing, soft tissue desensitization
• Diode	• 800-830, 950-1010nm	• Soft tissue, periodontics
• Nd: YAG	• 1064 nm	• Soft tissue, periodontics, desentization, analgesia, tooth whitening, and endodontics
• Er: YSGG	• 2.79 µm	• Hard tissue
• Er: YAG	• 2.94 µm	• Hard tissue

Table 1. Classification Based on use of Lasers

Suresmile® system: in this system an optical intraoral scanner is used to acquire a three dimensional digital model of teeth and brackets. Digital models are then used to create a set up of the teeth in the desired final positions. Customized arch wires are robotically formed to incorporate all necessary bends to exert forces and moments to achieve the desired position of teeth. And these customized arch wires are used in non custom brackets to achieve an individualized treatment outcome.

Incognito™ system: comprise of fully customized lingual bracket system. Laboratory or digital set up is used to predetermine the desired positions of teeth. This system has been shown to be highly precise, and is an esthetic treatment option that offers greater control over tooth movement than clear aligners in many cases.

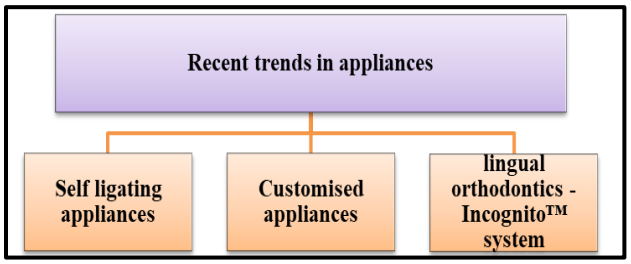

Figure 2. Recent Trends in Orthodontic Appliances

TEMPORARY ANCHORAGE DEVICES (TAD)[10]

Anchorage has always played a crucial role in orthodontics. Irrespective of the biomechanics incorporated into the various systems to minimize the anchorage loss in all the planes, it continues to be an area of concern. The introduction of TAD's into the field of orthodontics has revolutionized the scope of treatment possibility. TAD's serve as an absolute anchorage to move the teeth in the desired directions, which is impossible to be achieved with the help of conventional treatment alone.

ADULT ORTHODONTICS[1,11]

With increase in number of adult patients seeking orthodontic treatment, the demand for esthetics during the orthodontic treatment has gained the momentum. Clear aligners and lingual orthodontic treatment satisfied a large range of patient's expectations. On the other hand Clear aligner uses a set of aligners to correct the malocclusion from its initial phase to the final. It takes into advantage the possibilities of CAD-CAM imaging. Adult treatment can be categorized

as shown in Table 2.

SPECIAL CONSIDERATION IN TREATMENT FOR ADULTS		
COMPREHENSIVE TREATMENT	**ADJUCTIVE TREATMENT**	**SURGICAL ORTHODONTICS**
• Adults receiving comprehensive treatment are the main candidates for esthetically-enhance appliances the prime examples being clear aligners, lingual appliances, and ceramic facial brackets	• Adults receiving adjunctive treatment are the candidates who need another treatment together with the primary treatment.	• Surgical first approach is used widely

Table 2. Special Consideration in Orthodontic Treatment of Adults

ACCELERATED ORTHODONTICS[12-14]

Many researches are underway on shortening the span of treatment, namely the corticotomy, Accelerated osteogenic orthodontics, low level laser, low frequency mechanical vibrations shown in Table 3, these methods have not gained wide acceptance due to the invasiveness and the armamentarium involved. Biological methods for accelerating tooth movement, involving the prostaglandin E (PGE), Receptor activator of nuclear factor kappa-B ligand (RANKL), Interleukin etc are subjected to large number of research at present times.

ACCELERATED ORTHODONTICS		
Drugs or Pharmacological	**Physical methods**	**Surgery assisted**
• Cytokine • PTH • Vitamin D3 • Relaxin	• Resonance vibration • Low level laser • Static magnetic field • Direct electric current • Pulsed electromagnetic field • Device assisted vibration	• Corticotomy • Wilcodontics/PAOO • Peizocision • Intraceptal alveolar surgery

Table 3. Methods of Accelerated Orthodontics

Accelerated Osteogenic Orthodontics (AOO): In this procedure, selective corticotomy are done followed by placement of bone grafting material.
-Reflection of full thickness flaps with multiple corticotomies and the bone grafting material are placed over the decorticated areas
-Regional acceleratory phenomenon (RAP) takes place in the selected areas.
-As a result, increase in metabolic activity (including modeling and remodeling) initiated by injury to bone accelerate the teeth movement with result of short treatment period.

Modified Corticotomies: Less invasive surgical procedure--multiple vertical incisions without flap reflection.

CONCLUSION

Today's challenge in orthodontics is to improve the quality of oral health while satisfying the developing needs. In order to encounter the new challenges and to upgrade the feature of our present treatment needs the combined efforts of dental education, dental research, and dental practice will be needed. The time is not far away when there will be no impressions, no plaster models, no tracing papers, and no pliers in the orthodontic office. But it is important that these tools should be cost effective, so that benefits of these technologies can be extended to all sections of society including economically disadvantageous population and those living in remote locations.

REFERENCES

1. Proffit WR, Fields HW, Larson B, Sarver DM. Contemporary orthodontics-e-book. Elsevier Health Sciences; 2018 Aug 6.
2. Roberts-Harry D. Lasers in orthodontics. British Journal of Orthodontics. 1994;21(3):308-12.
3. Fujiyama K, Deguchi T, Murakami T, Fujii A, Kushima K, Takano-Yamamoto T. Clinical effect of CO2 laser in reducing pain in orthodontics. The Angle Orthodontist 2008;78(2):299-303.
4. Nalcaci R, Cokakoglu S. Lasers in orthodontics. European Journal of Dentistry 2013;7(Suppl 1):S119.
5. Borzabadi-Farahani A, Cronshaw M. Lasers in orthodontics. In Lasers in Dentistry—Current Concepts 2017. Springer, Cham. pp:247-71.
6. Khajuria AK, Prasantha GS, Mathew S, Khan Y. LASERS in Orthodontics. Journal of Dental and Orofacial Research. 2016;12(2):20-4.
7. Jacob J. Orthodontics and Beyond-An Overview of the Changing Concepts and Current Trends in Orthodontics. EC Dental Science 2017; 7(4):153-4.
8. Heymann GC, Grauer D. A contemporary review of white spot lesions in orthodontics. Journal of Esthetic and Restorative Dentistry. 2013;25(2):85-95.

9. Muggiano F, Quaranta A. The Incognito Appliance System: A Fully Customized Lingual Orthodontic Appliance. Webmed Central 2013;4(10):WMC004437. https://doi.org/10.9754/journal.wmc.2013.004437
10. Cope JB. Temporary anchorage devices in orthodontics: A paradigm shift. Semin Orthod. 2005;11:3–9.
11. Peiro-Guijarro MA, Guijarro-Martínez R, Hernandez-Alfaro F. Surgery first in orthognathic surgery: a systematic review of the literature. American Journal of Orthodontics and Dentofacial Orthopedics. 2016;149(4):448-62.
12. Agrawal A, Gaur G, Dagur LS, Bhadauria US, Seth K, Parmar S. Fast track tooth movement: An amalgamation of periodontics and orthodontics. The Saint's International Dental Journal. 2020;4(1):23-9. https://doi.org/10.4103/sidj.sidj_2_20
13. Zimmo N, Saleh MH, Mandelaris GA, Chan HL, Wang HL. Corticotomy-accelerated orthodontics: a comprehensive review and update. Compend Contin Educ Dent. 2017;38(1):17-25.
14. Unnam D, Singaraju GS, Mandava P, Reddy GV, Mallineni SK. Accelerated Orthodontics–An overview. J Dent Craniofac Res. 2018;3(1):4. https://doi.org/10.21767/2576-392X.100020

Cite this article as:
Mallik A, Malhotra Y, Badhan A, Malhotra PU, Rasila D. Current Trends in Orthodontics. Int Healthc Res J. 2020;4(8):RV1-RV4. https://doi.org/10.26440/IHRJ/0408.11285

Source of support: Nil, **Conflict of interest:** None declared

AUTHOR AFFILIATIONS: (*: Corresponding Author)
1. MDS (Orthodontics and Dentofacial Orthopedics), Consultant Orthodontist, Siliguri, WB, India
2. MDS (Orthodontics and Dentofacial Orthopedics), Consultant Orthodontist, Kangra, HP, India (Corresponding Author)
3. MDS (Orthodontics and Dentofacial Orthopedics), Consultant Orthodontist, Chandigarh, India
4. MDS (Paediatric and Preventive Dentistry), Medical officer (Dental), Community Health Centre, Nalagarh, Solan, HP, India
5. MDS (Periodontics), Birmingham, Alabama, USA

Contact Corresponding Author at: y9417804155[at]gmail[dot]com