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Changing trends in orthodontics : An era journey

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Abstract

The key role of changing one's aesthetic by changing its teeth alignment is performed by orthodontist.The development of newer technologies made it easier for orthodontist to diagnose the main root cause of the malocclusion and decide the best possible treatment result for the patient. The newer techniques lead to better aesthetics,lesser treatment duration and more pleasing treatmet techniques for the patients. 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, Brackets, Invisalign, CBCT, Aesthetics, Trends.

Introduction

Man has been strain for times and generations to enhance his outlook, physical being, his appearance- what he calls the esthetic worth. The face (in general) and teeth have additionally return to play a region in his presentation to the surface world. to reinforce this want, attention has been given to correct the malformations of teeth. Earlier terribly crude ways were used for this propose. But, now a day, new technologies have stumble upon the globes that have utterly modified the ways in which, ancient orthodontics has been practiced until date.

Three periods could also be outlined within the past dental medicine century, supported a pair of major panels—technologic developments and treatment modalities—both with obvious correspondence within the various temporal periods. (Table 1).

Period	Technological developments	Treatment modalities	Imaging*
1	ca 1907		Cephalometrics, 1931 Panoramic, ca 1960
	- Brackets/wires *(Begg interlude)*	- Non Extraction - Extraction	
	"Latest and best" edgewise spill-over	The debate	
2	ca 1975		
	- Bonding/"smart" brackets - Lingual appliances - Smart wires	- Non Extraction - Gnathology - Orthognathic surgery *(Relapse interlude, then rigid fixation)*	
	Space age spill-over	Pushing the envelope	
3	ca 1990/95		Imaging programs (simulation), ca1990 CBCT Mouth scanner
	- Invisalign - Temporary anchorage devices - Microvibrations	- Non Extraction - Shifting borderlines between orthodontics/ orthognathic surgery - Less invasive surgery: decortication, microperforations	
	Information technology spill-over	Toward personalized treatment	
GOALS	More controlled, faster movement; Less noticeable appliances	Occlusion/Function; Balance of facial esthetics; Stability	Precise anatomic representation

Table 1: Key orthodontic developments in the past 100 years organized into 3 defined periods.

The First Period: Edgewise Spill-Over

This phase was entitled as "latest and best" as it comprised of the introduction of the edgewise brackets and the Begg's techniques. Angle philosophy of non extraction approach of the orthodontic treatment was highlight of this era[1]. After Angle's death (1930) one of the descendent, Charles Tweed, reintroduced tooth extraction approach in the United States[2], which was advocated by Raymond Begg in Australia. Accompanying these developments were key radiographic innovations which included introduction of Cephalometry (1931) at a minimum supported the clinical findings which elevated more comprehensive diagnosis, justification for treatment planning, Panoramic radiography (about 1960) considerably facilitated assessment and evaluated perfection in treatment.

The Second Period: Space-Age Spill-Over

This period was of short duration as World War II hit the world. The mid-1970s ushered in a series of technologic developments that mark orthodontics to this day. The introduction of the straight-wire method with prescription brackets, in combination the 6 keys of normal occlusion by Andrews[3], enhanced the rate of success of orthodontic treatment. The innovation of the "smart wires" made up of the nickel-titanium alloy wire, warranting the nickname of this second period as "space-age spill-over." These development make the treatment more comfortable for the orthodontist and the patient too. After the development of smart wires, the technique of unseen braces came in being which was mark in field of orthodontics. The ceramic brackets, provided answers to the demand for less noticeable and thus more esthetic appliances. The practitioner was provided with faster, more practical techniques. Self-ligating brackets were introduced in this era and expanded in the next, with the premise of better controlled mechanics, greater patient comfort, and improved practice management.

The Third Period: Information Technology Spill-Over

The era of third phase was highlighted by four different practices which included new series of esthetic treatment methods, reduced treatment duration, better anchorage control mechanics, and newly imaging techniques which improves treatment planning and diagnosis.

Three main developments emerged in this period:

- Temporary anchorage devices- "The latest and best in anchorage control," orthodontic miniscrews, also known as mini-implants and (nonosseointegrated) temporary anchorage devices, may be viewed as the revolution of the orthodontic century, "the holy grail of orthodontics," a solution to both compliance and controlled anchorage.[4]

- Esthetic appliances- Operator difficulties and cost, if not compromised results, prevented a wider application of various modes of lingual appliances, now stratified into 2-dimensional and 3-dimensional (3D) modes. On the other hand, clear aligners established an esthetic revolution. A variety of aligners were introduced based on computing, imaging, milling, and robotic technologies.Most polpular of is Invisalign (Align Technology, San Jose, Calif). Research has disclosed limitations in success and compromised excellence in more complicated malocclusions: the aligner alone does not seem adequate to achieve high-quality results but, rather, requires multiple adjunctive approaches for various clinical situations.[5]
- Imaging methods-Diagnosis and treatment planning were enhanced by 3D imaging (cone-beam computed tomography [CBCT]), outcome simulation, and mouth scanners. Computed tomography became user-friendly. in orthodontics and implant dentistry by the advent of CBCT.[6] CBCT also has not on average provided growth and outcome data with major differences from 2-dimensional cephalometric findings. Outcome simulation, particularly helpful in orthognathic surgery, was further enhanced by the CBCT provided 3D application.

Digital Models

There was introduction of E-Models which reduced the dental cast management and its outcome of handling and misplacement. The management of patient data made more convenient. Treatment approaches of the ongoing third period maintain an anchor in esthetics and the smile and they increase, albeit slowly, reliance on biologic principles and individual variations, moving away from the more mechanistic modes.

Accelerated Orthodontics

Another new developments included Decortication (Wilckodontics and microperforations) and microvibrations. “Accelerated osteogenic orthodontics” through interproximal surgical cortical cuts (decortication) is but another application of the regional acceleratory phenomenon, yielding faster results than regular similar treatment, regardless of agreement with the treatment plan, the perfection of finishing, or the possibility of periodontal recession.[7-9]

Customized Medicine

There was more emphasis on personalized treatment which included replacing the older paternalistic approach by reinforcing the patient's rights, privacy, confidentiality, and partnership, the emergence of personalized medicine. First Personalized medicine forces the proper diagnosis, which must encompass the patient's constitution—thus“structural and functional harmony and wellbeing of the total person.”[10]

Customised Appliances

Customized Appliances are the 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®** was one of the first customized appliances to use a digital set up of the patient’s teeth to plan the final outcome and fabricate appliances. All clear aligner systems have limitations to desired tooth movements[11].
- **Suresmile® system:** uses an optical intraoral scanner to acquire a three dimensional digital model of teeth and brackets. Digital models are used to create a set up of 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. To achieve

individual treatment outcome customized wire is utilized[12].

- **Incognito™ system:** fully customized lingual bracket system. Laboratory or digital set up is used to predetermine the desired positions of teeth. It helps to to adapt the brackets closely to teeth. Customized arch wire are technically manufactured which have prescribed necessary bends to allow desired moments.It develops highly accurate and is an esthetic treatment option that offers greater control over tooth movement[13] .

Lasers in orthodontics

Most common Laser types with orthodontic applications: Erbium (YAG or YSGG) for Hard or soft tissue ablation and Diode for Soft tissue ablation only[14].

Applications

- Soft tissue exposures (facial canines)
- Operculum excision

Customized smile design systems

To design patient's smile now a days new technique of customized smile design systems is advocated by orthodontist using 3-D planning software, using their facial and dental features as a guide. This technology also predicts the smile outcome and helps orthodontist to give better description to the patient.. Using 3-D planning software and impressions of each individual's teeth, we can create three-dimensional models of their dental structure. Based on desribility of the treatment needs custom made wires and brackets can be produced[15].

Conclusion

To give better treatment with latest technology leads to orthodontists to open their eyesight towards emerging techniques. The developing techniques not only improve the aesthetic needs but also provide good oral hygiene options to the patients. 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.

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