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RESEARCH ARTICLE

INTERDISCIPLINARY ORTHODONTICS

^{1,*}Dr. Puneet Sharma, ¹Dr. Ishata, ¹Dr. Neeraj Yadav, ²Dr. Charu Maini and ³Dr. Pradeep Yadav

¹PG Student, Dept. of Orthodontics and Dentofacial Orthopedics, Dr. Harvansh Singh Judge Institute of Dental Sciences and Hospital, Sector-25, South Campus, Panjab University, Chandigarh, India

²BDS, Dr. Harvansh Singh Judge Institute of Dental Sciences and Hospital, Sector-25, South Campus, Panjab University, Chandigarh, India

³PG Student, Dept. of Oral and Maxillofacial Surgery, Dr. Harvansh Singh Judge Institute of Dental Sciences and Hospital, Sector-25, South Campus, Panjab University, Chandigarh, India

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ABSTRACT

In the recent times, with the increasing expectations of the patients to an esthetically good and functionally stable treatment result, the practice of dentistry is changing from a single specialist practice to that of a team approach involving general dentist and various specialists. In orthodontic treatment, the endodontic procedures (like root canal treatment and restorations) and periodontal procedures (scaling and root planning) must be carried out before initiation of orthodontic treatment. The oral surgery procedures can be carried out at any stage of orthodontic treatment whether before treatment (corticotomy procedures), during treatment (exposing impacted tooth, extractions) and after treatment (frenectomy, orthognathic surgery). The prosthodontic procedures to replace the missing teeth must be carried out after completion of orthodontic treatment. During orthodontic treatment extraction space either can be maintained for prosthesis or can be closed orthodontically to prevent a lifelong prosthesis. An interdisciplinary dentofacial therapy is the effective and efficient utilization of the skills in the various disciplines of dentistry. Its key is the combination of diagnostic, treatment planning and therapeutic procedures with extensive communication among all team members. The present paper briefly describes an interdisciplinary approach for the management of complex dentofacial problems produces consistent optimal results.

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INTRODUCTION

We live in a modern era where science and technology knows no boundaries. Our dental profession is no less; it is evolving into its best at present times. The amalgamation of basic molecular science and engineering technology has had a huge impact on the modern world of medicine and dentistry. Advances in the studies of human genetics, stem cell biology, medicine, and proteomics have allowed for the application of tissue engineering to clinical problems in dentistry. With this change in knowledge and awareness, the demand and responsibility of dentistry is increasing to higher level (Patil *et al.*, 2013). Orthodontic treatment of adults has been the fastest growing area in orthodontics in recent years. Many orthodontic practices today include 45% of patients as adults. This is because of an increased awareness benefits of orthodontic treatment.

*Corresponding author: Dr. Puneet Sharma,

PG Student, Dept. of Orthodontics and Dentofacial Orthopedics, Dr. Harvansh Singh Judge Institute of Dental Sciences and Hospital, Sector-25, South Campus, Panjab University, Chandigarh, India.

In addition to aesthetics, recent advances in orthodontic materials are made aesthetically pleasing and are biomechanically sound appliances, and the interdisciplinary treatment philosophy have all played an important role in making orthodontic treatment popular in adult population (Spear *et al.*, 1997). In the recent times, with the increasing expectations of the patients to an esthetically good and functionally stable treatment result, the practice of dentistry is changing from a single specialist practice to that of a team approach involving general dentist and various specialists. This enables the best utilization of the skills and expertise of clinicians of different specialties for the best possible treatment outcome of the patient. Such care involving team approach of a patient's dental needs is defined as interdisciplinary treatment. Interdisciplinary approach is indispensable for patients with compromised dentition. It is also of greatest importance in adult patients presenting with severe jaw discrepancies, abraded teeth, failed restorations, tipped teeth, edentulous spaces from previous tooth extraction, periodontal breakdown, and many other periodontal and restorative problems (Karad Ashok, 2010).

Multidisciplinary and Interdisciplinary approach (Rebecca L Jessup, 2007): Multidisciplinary team approach involves the utilization of the skills of individuals from different disciplines, with each discipline approaching the patient from their own perspective. Most often, this multidisciplinary approach involves separate individual consultations with different disciplines. These may occur in a “one-stop-shop” fashion with all consultations occurring as part of a single appointment on a single day.

The multidisciplinary teams meet regularly, in the absence of the patient, to “case conference” findings and discuss future directions for the patient’s care. Multidisciplinary teams provide better knowledge and experience than disciplines operating in isolation. Interdisciplinary team approaches, as the word itself suggests, combine separate discipline approaches into a single consultation. This means, the initial assessment, patient-history taking, diagnosis, intervention and short- and long-term management goals are conducted by the team, along with the patient, at the one time. The patient is personally involved in any discussions regarding their condition or prognosis and the plans about their care. A common interpretation and holistic view of all aspects of the patient’s care developed, with the patient empowered to form part of the decision-making process, including the setting of short and long-term treatment goals. Individuals from different disciplines, as well as the patient themselves, are encouraged to question each other and explore alternate avenues, stepping out of discipline silos to work toward the best outcome for the patient.

Interdisciplinary philosophy: An interdisciplinary therapy is the effective and efficient utilization of the expertise and skills in the various disciplines of dentistry. It is the combination of diagnostic, treatment planning and therapeutic procedures with extensive communication among the team members. An interdisciplinary approach to the management of complex problems of dentofacial region produces consistent favorable results. By providing solutions to variety of problems, an interdisciplinary treatment approach simplifies the treatment plan that improves the overall treatment prognosis and enhances the treatment results.

Orthodontics–periodontics relationship: An interdisciplinary approach is essential for the management of periodontal-orthodontic patients. It is important for orthodontists to identify periodontal problems before orthodontic treatment, determine the correct treatment plan to ameliorate these problems, and sequence the orthodontic and periodontal therapy correctly to enhance the patient’s periodontal health (Graber, 2012). Prior to undertaking any orthodontic treatment, the periodontal tissues must be stabilized with the creation of a healthy periodontium, devoid of any active inflammatory disease.

There is a need for a professional maintenance program during orthodontic treatment aimed specifically at preventing repopulation of pockets with periodontopathic organisms. The key element in the orthodontic management of patients with periodontal disease is to eliminate, plaque accumulation or reduce its level and gingival inflammation. This implies priority on oral hygiene instructions, appliance construction, and periodontal check ups throughout the treatment (Orban’s, ?).

Orthodontics – oral surgery relationship

Management of Impacted Tooth: Impaction of tooth is a retardation or halt in the normal process of eruption. According to Kuffinec and Shapira, impaction is a condition in which a tooth is embedded in the alveolus so that its eruption is impeded and it is locked in position by bone or by adjacent teeth. In current perspective, an impacted tooth is one “whose eruption is considerably delayed, and for which there is clinical or radiographic evidence that further eruption may not take place (Mason *et al.*, 2001).” Impacted teeth are often encountered during the diagnosis and treatment of malocclusion in adult patients. After the third molars, the most commonly impacted tooth is the maxillary canine with an incidence of 1%-3%, which varies depending on the ethnicity of the same population (Peck, 1994; Bishara, 1998; Chung, 2011). Management of impacted teeth involves the interdisciplinary approach between oral surgeon and orthodontist. Accurate diagnosis and prognosis of impacted tooth is assessed by orthodontist that whether to extract the impacted tooth or bring it into arch orthodontically. Then according to treatment plan oral surgeon expose the impacted tooth or extract the tooth respectively.

Management of Severe Jaw Discrepancies: Another interdisciplinary approach that involves orthodontist and oral surgeon is orthognathic surgery. Orthodontic treatment is usually an essential part of contemporary orthognathic treatment. In most cases, the achievement of a satisfactory post-surgical occlusion will require the use of fixed appliances to achieve optimal arch coordination and inter-digitation. The magnitude of surgical jaw correction that can be achieved is, to a large extent, dictated by the size of the overjet (positive or negative), which often needs to be adjusted through carefully planned decompensation of incisors. It also stands to reason that the stability of the surgical jaw correction should be assisted by a well inter-digitated occlusion. Whilst most of the patients seeking orthognathic surgery report their concerns regarding facial aesthetics, a large proportion are also unhappy with the appearance of their teeth. The ideal alignment that fixed appliance treatment can attain helps to deliver optimal dental aesthetics as part of the overall treatment outcome.¹¹ In orthognathic procedures the dentoalveolar decompensation is done by the orthodontist giving sufficient overjet for surgical repositioning of jaws. Then jaws are repositioned by oral surgeons.

Autotransplantation of Tooth: Transmigration refers to the physiological migration of an unerupted tooth across the midline in the absence of pathology or trauma. Multidisciplinary care involving orthodontic creation of the recipient space, surgical extraction of the transmigrated tooth followed by implant replacement and crown or autotransplantation of the transmigrated tooth to the recipient site (Savana *et al.*, 2014)

Orthodontics–Prosthodontics Relationship: In adult patients, pathologic migration can be caused by loss of teeth or periodontal breakdown. This can result in the development of a median diastema or generalized spacing of the teeth with or without incisor rotation, proclination or tipping of premolars and molars and collapse of the posterior occlusion with decreasing vertical dimensions. Treatment is complex in patients with many missing and periodontally compromised teeth. The primary objective of periodontal therapy is to restore

and maintain the health and integrity of the attachment apparatus of the teeth. Interdisciplinary orthodontic therapy is necessary to solve these problems and can facilitate management of several restorative and esthetic problems or difficulties relating to tipped abutment teeth, excess spacing, fractured teeth, inadequate pontic space, malformed teeth, hypererupted incisors, and diastema. Missing teeth are required to be replaced either before or after treatment. In some patients temporary pontics or riding pontics are required to temporarily close the space. So including other specialties the prosthodontics is also very important to meet requirements of orthodontic patient (Pinho *et al.*, 2012). Treatment alternatives for restoring edentulous spaces resulting from congenitally missing laterals include removable partial dentures, fixed bridges, resin bonded bridges, auto transplantation, orthodontic repositioning of canines to close the edentulous space, and single tooth implant. Although in cases space for implant placement is deficient due to migration of adjacent teeth, the migrated may have to be repositioned orthodontically to create adequate space for an implant, implants do not necessitate "altering" or "removing" parts of the natural dentition and are therefore this approach is the most conservative of the prosthodontic options for replacing missing lateral incisors. Implants can also maintain the alveolar ridge, enhance occlusal function and provide optimal esthetics. For patients with congenitally missing lateral incisors who have over retained lateral incisors or canines, keeping the primary tooth as long as possible should be considered to preserve the supporting alveolar bone for future implants. Most common treatment for such congenitally missing teeth is single tooth implant. Orthodontist plays an important role in preparation of implant placement.

When planning for the placement of a single tooth implant, the orthodontist must ensure adequate space between the crowns and roots. The parameters like quantity and quality of alveolar bone must be assessed before implant placement is considered. To accommodate a standard implant there should be a minimum of 10 mm of incisogingival bone and a minimum of 6.0 mm of faciolingual bone. Adequate space for the implant is also required between the adjacent roots. The average dental implant fixture width is 3.75 mm, and space required is 1 to 2 mm between the fixture and the adjacent roots. Typically, between 6 and 8 mm of bone between the central and canine roots is recommended¹⁴.

Role of orthodontist in interdisciplinary management of cleft lip and palate:

The care of cleft lip and palate patients requires a number of specialists including psychologists and social workers to provide a comprehensive treatment from birth to adulthood. During early days, immediately after birth of child with cleft lip and palate the feeding specialist, neonatologist, orthodontist and the cleft surgeon take the lead role. After the first year, issues with hearing, middle ear infections and speech therapy are more relevant and important issues to be tackled with. Similarly, later during the late mixed dentition stage orthodontist would need greater indulgence and at adulthood the correction of secondary deformities of lip and nose is required where plastic surgeons would play a key role. A prosthodontist may be required to rehabilitate missing teeth and form aesthetic treatment of the dentition. The orthodontist monitors dental development, occlusion, skeletal problems and institute interceptive therapy, dentofacial orthopaedics and prepares for secondary alveolar bone graft. The orthodontists' expertise in roentgenoccephalometry and craniofacial growth

uniquely qualifies him or her to monitor craniofacial growth, dental development and treatment results (Kharbanda, 2013)

Conclusion

A comprehensive patient's care in many cases involves a multidisciplinary treatment approach. It is important that the orthodontist together with the other specialists frame a treatment objective which are realistic and meet the needs of the patient. Constant interaction and communication among the various team members along with the patient at all level of treatment are the keys to the success of the interdisciplinary treatment. In interdisciplinary approach one must know the sequence to be followed in different cases. In orthodontic treatment, the endodontic procedures (like root canal treatment and restorations) and periodontal procedures (scaling and root planning) must be carried out before initiation of orthodontic treatment. The oral surgery procedures can be carried out at any stage of orthodontic treatment for example before treatment (corticotomy procedures), during treatment (exposing impacted tooth, extractions) and after treatment (frenectomy, orthognathic surgery). The need for oral surgery procedures whether required before, during and after treatment can vary from case to case. The definitive prosthodontic restorations must be carried out after completion of orthodontic treatment. During orthodontic treatment extraction space either can be maintained for prosthesis or can be closed orthodontically to prevent a lifelong prosthesis. A word of caution to be told to patient opting for prosthesis that if future orthodontic treatment is planned they may not require the prosthesis. Similarly extraction of any tooth especially third molars should be cautioned to patient who might consider orthodontic treatment in future

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