

CBCT as Surgical Guide in Removal of Multiple Impacted Supernumerary Teeth in Maxilla: A Case Report

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Abstract: Multiple Impacted Supernumerary Teeth Especially In Maxilla Poses A Challenge To Maxillofacial Surgeons. Often, There Is Alack Of Sufficient Information Regarding The Accurate Anatomic Localization And Proximity Of Impacted Teeth To Adjacent Normally Erupted Tooth Or Its Roots, Maxillary Sinus, Nasal Floor Or Other Essential Anatomic Structures From Conventional Radiographs Like Orthopantomogram(OPG). These Technical Shortcomings Can Be Overcome By The Use Of 3D Imaging Like Cone Beam Computed Tomography(CBCT). The Cone-Beam Computed Tomography (CBCT), Compared To The Conventional Radiography, Has A Greater Potential To Provide Complementary Information Because Of Its Three-Dimensional (3D) Images, Reducing The Amount Of Bone Loss And Failures In Surgical Procedures. We Report The Case Of A 14 Year Old Female Patient With Multiple Impacted Supernumerary Teeth In Maxilla Treated In Our Department. She Presented With Malaligned, Ectopically Positioned Maxillary Anterior Teeth. On Examination A Palatal Bulge Was Noted On The Palatal Aspect Of 11, 12 And 21. A CBCT Maxilla Was Taken To Aid In Diagnosis, Localization And Surgical Treatment. The Patient Underwent Surgical Removal Of Impacted Teeth. Post Operative Period Was Uneventful With Least Patient Discomfort As A Result Of Minimal Bone Removal, Better Technique And Shorter Operative Duration.

Keywords: Impacted Supernumerary, Cone Beam Computed Tomography

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I. Introduction

A Supernumerary Tooth Is A Developmental Anomaly Of Number Characterized By The Presence Of Tooth In Addition To The Normal Series.[1,2] Its Prevalence Rates Reported In The Literature Vary Between 0.1% And 3.6% In The Permanent Dentition Depending On The Respective Population.[3] Supernumerary Teeth Can Occur As Single, Multiple, Unilateral Or Bilateral And In The Maxilla, The Mandible Or Both.[4,5] There Are Several Hypotheses Which Have Been Proposed To Explain The Occurrence Of Supernumerary Teeth, And Their Etiology Remains Unclear.[6] Supernumerary Teeth May Lead To Complications Like Failure Of Adjacent Teeth To Erupt, Displacement And Crowding Of The Adjacent Teeth, Root Resorption, Diastema And Dentigerous Cyst Formation. The Position And Nature Of These Impacted Teeth Are Evaluated Traditionally With Radiographs Like Intraoral Periapical, Occlusal, Panoramic Or Cephalometric Radiographs. A Single Occlusal Or Periapical Film Gives The Most Detailed Picture Of The Tooth In The Incisor Region, While The Bucco-Lingual Position Can Be Defined Using The Parallax Technique, Namely, The Horizontal Tube Shift Technique.[7] However, The Use Of Two-Dimensional Images May Display The Presence Of unerupted Teeth But Makes Any Analysis Difficult Because Of The Distortions, Artifact Effects And Image Superposition; Not Allowing Distinguishing Of The Details Such As Exact Location Of These Teeth, The Impact On Adjacent Teeth/Structures And The Anatomy Of Roots.[8] The Applicability Of 3D Imaging Technique Like CBCT To Dentistry Is Broad And Has Been Increasingly Employed As A Complementary Method For Diagnosis Of Maxillofacial Pathologies And Temporomandibular Disorders As Well As For Localization Of Impacted Teeth, Placement Of Implants, Orthognathic/Craniofacial Surgeries And Orthodontic Planning.[9] Particularly In The Case Of Impacted Or Supernumerary Teeth Removal, Surgeons Often Operate Adjacent To Significant Anatomical Structures Such As Vessels, Nerves, Adjacent Teeth Roots And Paranasal Sinuses.[10] The Diagnosis And Treatment Planning Is Facilitated With CBCT Because Images

Are Accurate In Determining The Angulation And Buccal Palatal Location[11] Besides Eliminating Image Superimposition And Allowing Tridimensional Reconstruction In Different Planes.[12]

The Aim Of This Article Is To Describe A Rare Case Of Multiple Impacted Maxillary Supernumerary Teeth In A Healthy 14-Year-Old Female Patient treated At Our OMFS Department While Discussing The Outcomes Of Using CBCT To Determine The Accurate Position Of Supernumerary Teeth And To Choose The Appropriate Surgical Technique.

II. Case Report

A 14 Year Old Female Patient Reported To The Department Of Oral And Maxillofacial Surgery, Trivandrum With The Chief Complaint Of Irregularly Placed Upper Front Teeth, First Noticed 5 Years Back And A Hard Tooth Like Structure Between Upper Front Teeth Since 3 Months. She Had A History Of Surgical Exposure Of Unerupted Anterior Permanent Tooth 5 Years Back. She Was Delivered By C Section With Normal Pre And Post Natal History. No Previous History Of Childhood Diseases Or Trauma Were Reported. The Developmental Milestones Were Achieved Normally. Her Younger Sibling(Brother) Had No Similar Complaints. Systemic Conditions And Syndromes Were Ruled Out.

Moderately Built And Nourished, No Significant Findings Were Noticed On General And Extraoral Examination. On Intraoral Examination, Malaligned And Ectopically Erupted Maxillary Anterior Permanent Teeth With Labially Positioned 21, Rotated 11? And Palatally Placed 22 Were Observed. A Palatal Bulge With A Portion Of Incisal Edge Of A Tooth Could Be Seen Palatal To 21. The Patient Presented With No Caries Or Periodontitis And Had A Satisfactory Oral Hygiene. Labial And Palatal Palpation For Further Impacted Teeth Pointed Towards A Tooth Like Structure On The Mucobuccal Fold Adjacent To 11 And 12 With No Tenderness Elicited. All The Mandibular And Maxillary Third Molars Were Unerupted.

Routine Blood Tests And Orthopantomogram(OPG) Were Advised. The Blood Parameters Were Well Within The Normal Limits. OPG Revealed The Presence Of Multiple Impacted Supernumeraries In The Anterior Maxilla With Proximity To Nasal Floor And Maxillary Sinus. All 4 Third Molars Were Impacted. Owing To Insufficient Radiographic Information Regarding Impacted Supernumerary Teeth From OPG, A CBCT(Cone Beam Computed Tomograph) Maxilla Was Advised.

Multiplanar CBCT Scan Was Obtained Using NewTomGianoScanner(Field Of View – 11 X 5 Cm) With 1mm Thin Slices. Vertical Impaction Of 11, Supplemental Tooth(Sn2) Mesial To 13, Oblique Impaction Of Supernumerary Tooth(Sn1) Just Below Impacted 11, Direct Contact Of Crown Of Sn1 With Root Of Sn2 And Palatally Positioned Impacted Supernumerary(Sn3) Were Observed In The CBCT. No Evidence Of Any Pathology Was Seen.

After Consulting With The Patient's Orthodontist, The Decision To Surgically Extract 11, Sn1 And Sn3 Was Arrived At. She Underwent The Surgical Removal Of Impacted 11, Sn1 And Sn3 By Crevicular Approach (Buccally And Palatally) With Minimal Bone Removal Under Local Anaesthesia. Following The Procedure, Closure Was Done With 3-0 Vicryl Sutures And We Put Her On A Course Of Oral Antibiotic Regimen For 5 Days. Postoperative Healing And Recovery Was Uneventful With Minimal Complications.

III. Discussion

Multiple Impacted Supernumerary Teeth In The Anterior Maxillary Region Can Cause A Delay In Dental Eruption, Thus Compromising The Normal Occlusal Development Besides Provoking A Series Of Esthetic, Speech And Psychological Complications.[13] One Of The Most Accepted Cause For Supernumerary Teeth Is The Hyperactivity Theory, Where The Supernumerary Teeth Are The Result Of Independent Local Hyperactivity Of The Dental Lamina.[14]

According To This Hypothesis, The Lingual Extension Of An Additional Tooth Bud Leads To A Eumorphic Tooth, While The Rudimentary Form Arises From The Proliferation Of Epithelial Remnants Of The Dental Lamina Induced By Pressure Of The Complete Dentition.[15] Moreover, Heredity Is Believed To Be An Important Etiological Factor In The Occurrence Of Supernumerary Teeth. Brook Proposed A Combination Of Genetics And Environmental Factors To Explain The Occurrence Of Supernumerary Teeth.[16]

Diagnostic Information Is Essential For Making A Clinical Decision, Whereas Surgical Planning Depends On Both Shapes Of Supernumerary Impacted Tooth And On Its Correct Localization.[17]

The Limitations Of Conventional Radiographic Imaging Can Be Attributed To 3D Structures Compression Leading To Difficulty In Accurate Evaluation Of The Relationship Of A Tooth's Roots With The Surrounding Anatomy As Well As Associated Resorption And Periapical Lesions. A Geometric Distortion (Minimum Magnification Of 5%) Of The Radiographed Object Can Be Expected Due To Anatomical Interferences Which Can Also Lead To Difficult Interpretation.[18,19] These Limitations Suggest That The Parallax Technique Is The Method Of Choice To Localize The Unerupted Teeth.[20] Two Parallax Radiographic Images Performed With Changes In The Horizontal Angulation Of The X-Ray Beam (Related To The Area Of Interest) Improve Appreciation Of Spatial Relationship In Dental Imaging. However, The

Accuracy Is Seldom Achieved Due To Oral Anatomical Confines, Even With The Use Of Digital Radiography.[21]

CBCT Allows The Impacted Tooth To Be Correctly Localized, Which Makes The Surgical Procedure Less Invasive, More Efficient And Quicker.[22] Problems With Amplitude And Superimposition Of Dental Structures, Which Makes Radiographic Interpretation A Particular Challenge, Are Potentially Eliminated By Using This Technique.[23] The Panoramic, Multiplanar Reconstruction, Serial Cross-Sectional And 3D Images Provided By The CBCT Are Useful In The Exact Localization And Morphologic Relation Of Multiple Supernumerary Impacted Teeth Among The Vital Structures. Vital Information Regarding The Amount Of Alveolar Bone Adjacent To Supernumerary Teeth, Proximity, And Root Resorption Of Adjacent Teeth, Anatomical Changes And Tooth Developmental Stage, Enable Surgery To Be Carefully Planned And Orthodontic Rehabilitation To Be Achieved. [24]

In Our Case After Radiographic Confirmation Of The Presence Of Multiple Impacted Supernumerary Teeth In Maxilla, Its Surgical Removal Was Advocated To Allow Proper Eruption And Realignment Of The Remaining Dentition And To Prevent Further Complication Of Occlusal Problems. The Major Drawback Associated With Conventional Radiographs Like OPG Is The Difficulty In Determining Exact Buccolingual Relation Between Teeth And Adjacent Dental Structures. As Given In The Figure 5,6,7 And 8,The 3D Reconstruction Images And Volumetric Scanning Of CBCT Helped In Accurate Anatomical Localization Of Impacted 11, Sn1 And Sn3 In Relation To Nasal Fossae. The Data Provided By CBCT Helped In Correct Identification Of 12 Initially Misinterpreted On Clinical Examination As 11. The Palatally And Buccally Impacted Supernumerary Teeth(Sn1,Sn3) And Impacted 11 Were Surgically Removed With Minimal Operative Duration And Patient Discomfort. The Superior 3D Visualization By CBCT Helped Us To Arrive At The Best Surgical Technique To Prevent Possible Injuries To Tooth Roots Or Structures Of Adjacent Teeth Besides Reducing The Risk Of Surgical Complications.

In The Above Case The Three Dimensional Imaging By CBCT Was Instrumental In Framing The Correct Diagnosis And Treatment Planning. As A Result, The Surgery Was Performed With Minimal Osseous Removal And Manipulation Of Soft Tissues In Addition To Reduced Operative Time, Better Patient Compliance, Reduced Pain And Satisfactory Postoperative Healing.

Preoperative



Figure 1

Figure 2 Figure 3

Orthopantomogram



Figure 4

Cone Beam Computed Tomogram(CBCT)

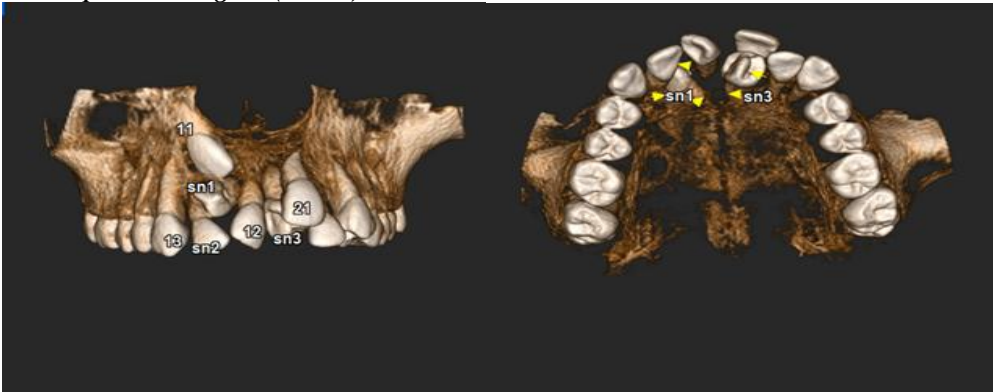


Figure 5

Figure 6

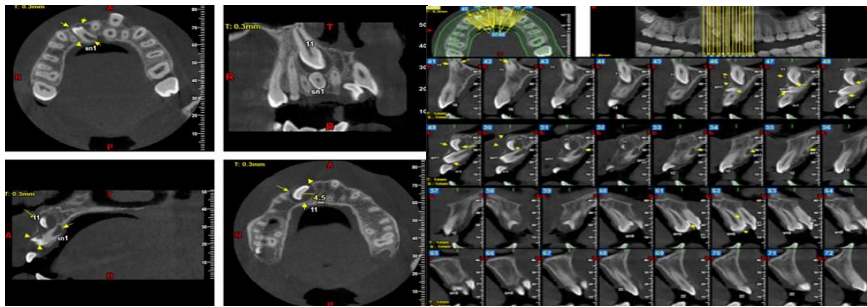


Figure 7

Figure 8

Intraoperative



Figure 9

Figure 10

Postoperative



Figure 11

IV. Conclusion

CBCT Provides Superior And More Accurate Anatomic Information Of Impacted Teeth Especially In Anterior Maxilla When Compared To Conventional Radiographs. As Seen In Our Case, CBCT As Surgical Guide Resulted In Higher Surgical Predictability, Time Saving And Minimal Bone Removal Which Lead To Better Postoperative Outcome. In Cases Involving Impacted Teeth In Anterior Maxilla Especially In Case Of Multiple Supernumerary Teeth, It Would Be Prudent To Advise CBCT As Evidenced From Our Findings.

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