Facial pattern II and III: soft tissue cephalometric analysis as a facilitator in diagnostic learning

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Abstract This study addresses the challenges of diagnosing and treating Facial Patterns II and III in dentistry, emphasising the importance of Cephalometric Soft Tissue Analysis (CSTA) in clinical evaluation and therapeutic decision-making. Two clinical cases were analysed using CSTA. These cases involved an undergraduate dental student and incorporated remote and face-to-face teaching activities. This involved reviewing the literature, studying orthognathic surgery and using specific software. Clinical assessments were carried out at the Faculty of Dentistry of the Federal University of Pelotas (UFPel) and included analysis and interpretation of facial, occlusal, masticatory muscle and temporomandibular joint data, as well as radiographic images. The CSTA provided crucial data for recognising skeletal discrepancies, enabling more accurate and well-founded diagnoses. The application of CSTA helped to clarify the relationship between aesthetics and function in patients with Facial Patterns II and III. It also enriched students' academic training by promoting critical thinking, clinical reasoning, and familiarity with technologies used in dental practice. CSTA has proved to be an effective tool for diagnosing skeletal alterations and a valuable resource in the teaching and learning process. This study highlights the importance of the National Curriculum Guidelines (NCGs), which promote the adoption of innovative, evidence-based methods to educate professionals who act ethically and critically and are committed to public health.
Descriptors: Cephalometric Analysis. Diagnosis. Soft Tissue. Education, Dental.

Patrón facial II y III: análisis cefalométrico de tejidos blandos como facilitador en el aprendizaje diagnóstico
Resumen Este estudio aborda los desafíos del diagnóstico y tratamiento de los Patrones Faciales II y III en odontología, destacando la importancia del Análisis Cefalométrico de Tejidos Blandos (ACTB) en la evaluación clínica y en la toma de decisiones terapéuticas. Se analizaron dos casos clínicos utilizando el ACTB. Estos casos involucraron a una estudiante de odontología e integraron actividades de enseñanza remota y presencial, que incluyeron la revisión de la literatura, el estudio de la cirugía ortognática y el uso de programas informáticos específicos. Las evaluaciones clínicas se realizaron en la Facultad de Odontología de la Universidad Federal de Pelotas (UFPel) e incluyeron el análisis e interpretación de datos faciales, oclusales, de los músculos masticatorios y de la articulación temporomandibular, así como de imágenes radiográficas. El ACTB proporcionó datos esenciales para reconocer discrepancias esqueléticas, permitiendo diagnósticos más precisos y fundamentados. La aplicación del ACTB ayudó a esclarecer la relación entre estética y función en pacientes con Patrones Faciales II y III, además de enriquecer la formación académica de las estudiantes al promover el pensamiento crítico, el razonamiento clínico y la familiaridad con las tecnologías utilizadas en la práctica odontológica. El ACTB demostró ser una herramienta eficaz para el diagnóstico de alteraciones esqueléticas y un recurso valioso en el proceso de enseñanza-aprendizaje. Este estudio destaca la importancia de las Directrices Curriculares Nacionales (DCN), que fomentan la adopción de métodos innovadores y basados en la evidencia para formar profesionales éticos, críticos y comprometidos con la salud pública.
Descriptores: Análisis Cefalométrico. Diagnóstico. Tejidos Blandos. Educación en Odontología.

Padrão facial II e III: análise cefalométrica de tecidos moles como facilitadora no aprendizado diagnóstico
Resumo Este estudo aborda os desafios do diagnóstico e tratamento dos Padrões Faciais II e III em odontologia, enfatizando a importância da Análise Cefalométrica de Tecidos Moles (ACTM) na avaliação clínica e na tomada de decisões terapêuticas. Dois casos clínicos foram analisados utilizando a ACTM. Esses casos envolveram uma

estudante de graduação em odontologia e integraram atividades de ensino remoto e presencial, incluindo revisão da literatura, estudo sobre cirurgia ortognática e utilização de softwares específicos. As avaliações clínicas foram realizadas na Faculdade de Odontologia da Universidade Federal de Pelotas (UFPel) e compreenderam a análise e interpretação de dados faciais, oclusais, dos músculos mastigatórios e da articulação temporomandibular, bem como de imagens radiográficas. A ACTM forneceu dados essenciais para o reconhecimento de discrepâncias esqueléticas, permitindo diagnósticos mais precisos e fundamentados. A aplicação da ACTM contribuiu para esclarecer a relação entre estética e função em pacientes com Padrões Faciais II e III, além de enriquecer a formação acadêmica das estudantes ao promover o pensamento crítico, o raciocínio clínico e a familiaridade com tecnologias aplicadas à prática odontológica. A ACTM mostrou-se uma ferramenta eficaz para o diagnóstico de alterações esqueléticas e um recurso valioso no processo de ensino-aprendizagem. Este estudo destaca a importância das Diretrizes Curriculares Nacionais (DCNs), que incentivam a adoção de métodos inovadores e baseados em evidências para a formação de profissionais éticos, críticos e comprometidos com a saúde pública.

Descritores: Análise Cefalométrica. Diagnóstico. Tecidos Moles. Educação em Odontologia.

INTRODUCTION

The dentistry course provides students with theoretical and practical training in clinical and surgical techniques. Oral and Maxillofacial Surgery, Prosthesis and Traumatology (OMFSPT) is a vital field requiring multidisciplinary knowledge[1]. In both orthodontics and OMFSPT, cephalometric soft tissue analysis (CSTA) is essential for three-dimensional facial assessment, supporting decision-making for the treatment of facial patterns II and III[2]. These practices align with the National Curriculum Guidelines (DCNs) for dentistry courses, which promote evidence-based methodologies and patient-centred active listening[3]. In complex cases, an integrated approach between surgery and orthodontics is imperative since orthodontics alone is insufficient to treat significant deformities[4].

In view of the above, this study aims to report the experience and analyse diagnostic outcomes in two different clinical cases, considering the teaching and learning processes of students who have recently enrolled on the Surgery III module of the dentistry course at the Federal University of Pelotas.

EXPERIENCE REPORT

The cases presented in this study were approved by the Research Ethics Committee of the Federal University of Pelotas (UFPel) in accordance with opinion no. 7.549.324. All patients involved signed an Informed Consent Form (ICF) authorising the use of their information for scientific purposes in accordance with the ethical principles governing research involving human beings.

The curricular component 'Surgery III' in undergraduate dentistry, and the contribution to the diagnosis of facial patterns II and III by means of CSTA, are exemplified by problematization and the patient information obtained through photography, software measurements, and clinical data. These processes develop students' skills, which can align with the professional profile expected to deliver quality and resolution.

In problematization, teachers have used various resources to stimulate the teaching and learning process. These resources include narratives of problem situations, scientific articles related to the lesson topic, and other tools such as films, short films, and documentaries. These resources are used in a playful way to encourage discussion and highlight areas for further study.

The first phase of the protocol involves a thorough analysis of the patient, covering various aspects. Photographs are taken of the patient's frontal, profile, open-mouth and closed-mouth views, accompanied by a thorough clinical facial examination. This takes into account elements such as the natural position of the head, centric relationship, relaxed tegument and mandibular deviations. A structured protocol is used to collect relevant information, taking into account

the patient's complaints, medical history, dental history, muscle and TMJ history, growth history, and the relief of symptoms such as obstructive sleep apnoea and joint pain. Facial changes over time are also considered.

The second stage involves additional tests that are essential for accurate analysis. An intraoral scanner provides three-dimensional digital models of the oral cavity, and a CT scan provides a detailed view of the bones and facial structures. The captured data is converted into STL format to generate a digital file that accurately represents the patient's characteristics. These files are then integrated with specialised software to lay the foundation for advanced cephalometric analysis.

Cephalometric analysis involves precisely identifying specific points in the soft tissues, including the subnasal point (SNP), supramentonian point (SMP) and gnathian point (GN). These points play a crucial role in assessing dentofacial relationships, proportions, and symmetries. The measurements obtained are compared with pre-defined norms using the standard deviation as the comparative criterion. A colour system is employed to offer a visual representation, identifying areas with a high standard deviation and distinguishing them from regions with minimal discrepancies. This colour scheme intuitively indicates the feasibility of an orthodontic approach in areas with minimal discrepancy, while areas with a higher standard deviation suggest the need for orthognathic surgery. This graphic presentation, integrated with the cephalometric analysis, plays an essential role in facilitating patient understanding and guiding clinical decisions. The second stage involves complementary tests that are essential for an accurate analysis. An intraoral scanner provides three-dimensional digital models of the oral cavity, while a CT scan provides a detailed view of the bones and facial structures. The captured data is converted into STL format to generate a digital file that accurately represents the patient's characteristics. These files are then integrated with specialised software to lay the foundation for advanced cephalometric analysis.

Clinical case 1: maxillary retrusion, false pattern III.

A convex facial profile was revealed by cephalometric analysis of the soft tissues. The subnasal point was anteriorly positioned, with protruding lips and a retruded pogonion, as well as discrepancies between the bone bases. These findings emphasised the necessity of surgical orthodontic treatment to prevent facial deterioration.

Clinical case 2: face pattern III, maxillary retrognathia and mandibular protrusion.

The patient had a concave facial profile. Cephalometric analysis of the soft tissues revealed that the subnasal point (Sn) was posterior to the true vertical line, while the pogonion (Pg) was anterior, indicating a significant skeletal discrepancy. This case indicated the need for surgical orthodontic treatment to address facial profile III and prevent facial decline. The use of CSTA for diagnosing significant types II and III skeletal discrepancies was found to be fundamental to decision-making in treating patients, as achieving facial function and harmony requires the correct solution to these deformities.

In contemporary facial surgery, the adoption of advanced soft tissue analysis protocols has become essential for achieving more accurate diagnoses and designing personalised treatment plans[10]. This article discusses the detailed application of these protocols in two unique cases, demonstrating the effectiveness of this innovative approach.

To solve the clinical cases presented, students are encouraged to carry out bibliographic searches, read texts and scientific articles, and look for book chapters. Based on a deeper understanding of the theory, they then develop answers and share their learning process in a round-table discussion. The 'Surgery III' curricular component provides guidelines for solving cases. These consist of producing a diagnostic analysis script and treatment plan based on the results of the cephalometric analysis and the aforementioned protocols. They also consist of written and photographic records of all impressions, opinions, doubts, and theoretical insights of the team. The aim is to develop a personalised therapeutic plan for each patient that reflects the historical course of all the facts and situations experienced in each clinical case. This provides not only a report (Figure 1) but also serves as a means of evaluating the teaching and learning process. Therapeutic decisions take into account the complexity of the case, the patient's expectations, and the desired results.

In addition to the above resources, students have used the internet and social media, such as Instagram, Facebook, YouTube and WhatsApp, as Information and Communication Technologies (ICTs)[5]. This gives students access to various articles and links, and facilitates communication between teachers and students.

Once the clinical cases have been completed, the topics covered are discussed, and students are encouraged to adopt a critical reflective stance regarding their experiences[6]. Subsequently, students are responsible for synthesising these

experiences and presenting them in the form of a poster or oral presentation at a scientific conference. This gives students experience in planning and developing diagnosis and treatment plans for future clinical challenges[6].

| Student's Journey | After the initial experience with simple clinical cases, the student joins the Oral Surgery III component, where they face the challenges of Facial Patterns II and III. They recognize the vital importance of TMJ assessment and the multidisciplinary approach in this context. |

| Learning with the Group | The student actively participates in remote and in-person activities, conducting research on orthognathic surgery and literature reviews. They use specific software for TMJ assessment and exchange experiences with peers and professors, encouraging theoretical deepening through bibliographic and technological resources. |

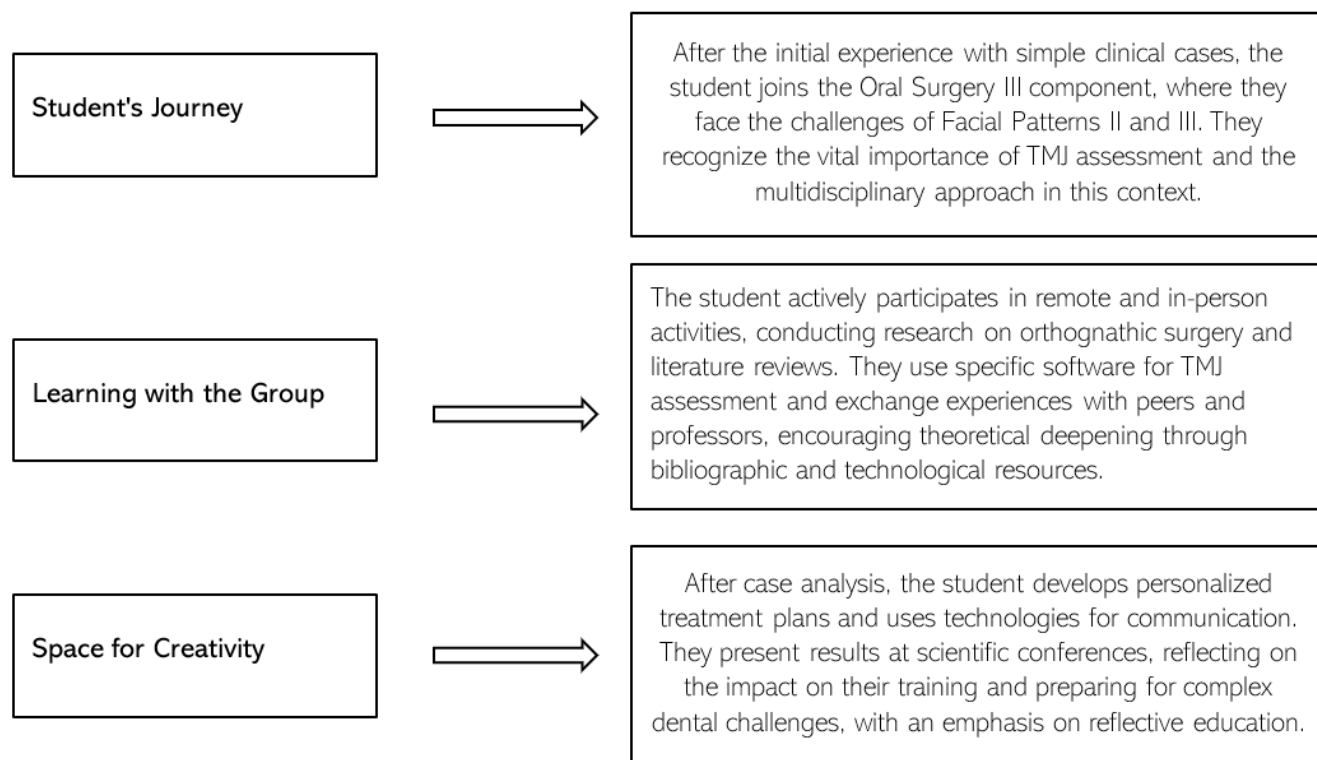| Space for Creativity | After case analysis, the student develops personalized treatment plans and uses technologies for communication. They present results at scientific conferences, reflecting on the impact on their training and preparing for complex dental challenges, with an emphasis on reflective education. |

Figure 1. Flowchart highlighting the academic progression in dentistry, from a student's initial experience to recognising the importance of soft tissue cephalometric analysis (SCA) and a multidisciplinary approach.

FINAL CONSIDERATIONS

This paper emphasises the ongoing importance of diagnosis as a key component in treating conditions affecting humans. Regardless of the methodology employed, the importance of diagnosis is emphasised, forming the basis for a clinical and surgical approach grounded in scientific evidence. The clinical cases presented emphasise the importance of incorporating soft tissue analysis into diagnosis and therapeutic planning to achieve long-lasting aesthetic and functional results. This approach aims to restore facial harmony and the health of the mandibular joints, occlusal stability, and skeletal balance.

The experience also highlights the potential of technology as a valuable resource for enhancing teaching and learning processes. Soft Tissue Cephalometric Analysis (SCA) has emerged as a scientifically backed approach that provides well-founded solutions, restoring function and harmonising the faces of patients with patterns II and III. This experience report underlines not only the effectiveness of the protocol in detailed soft tissue analysis, but also its relevance in personalising treatment and providing more precise and satisfactory therapeutic approaches.

These practices align with the National Curriculum Guidelines for the Dentistry course, which advocate applying advanced scientific knowledge and innovative technologies to improve population health and promote scientific and technological development[3].

A problem-solving approach is appropriate when topics are relevant to society and involve students in presenting them with challenges and encouraging them to develop the skills to solve them[7].

Furthermore, outdated teaching methods may hinder the intellectual and creative development of young people, as well as the effectiveness of learning in universities and professional training programmes. Education therefore needs to be

modernised to keep up with changes in the world. There is an urgent need for changes in teaching to keep pace with transformations in scientific practice and contemporary reality[8].

A problem-solving approach to teaching is appropriate when topics are related to life in society and present challenges, encouraging students to learn how to solve them. Unlike traditional educational practices, problematisation considers education to be a social exercise[8]. In a rapidly changing world, it is not just knowledge and ideas that are important, but above all students' ability to identify real problems and seek creative and original solutions[7].

In this context, a promising approach to optimising clinical results in Oral and Maxillofacial Surgery and Traumatology has emerged: the strategic convergence of advanced technologies, meticulous analysis and personalised planning for the teaching-learning process of students. This synergy between advanced tools and individualised treatment offers significant potential for achieving superior clinical results, setting a new standard for innovative and efficient practice.

In conclusion, introducing the Surgery specialty in the Surgery III curricular component gave beginning students a more critical and reflective view of reality, which contributed positively to disseminating this methodology and fostering a critical view of their responsibilities, as well as awakening an interest in teaching.

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