Prosthodontic rehabilitation of an edentulous maxilla opposing natural mandibular teeth: a preventive approach to Kelly's Syndrome

Rehabilitasi prostodontik pada rahang atas yang edentulus yang berhadapan dengan gigi rahang bawah alami: pendekatan preventif terhadap Sindrom Kelly

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ABSTRACT
Rehabilitation of an edentulous upper jaw that contacts natural lower jaw teeth poses unique prosthodontic challenges due to uneven load distribution. If not managed properly, this biomechanical imbalance can lead to Kelly Syndrome. A 55-year-old woman presented to Hasanuddin University Dental Hospital with the primary complaint of difficulty chewing and reduced self-confidence due to extensive tooth loss, but had never used dentures. Intraoral examination revealed total edentulism in the upper jaw and posterior tooth loss in the lower jaw, with teeth 33, 32, 31, 41, 42, and 43 remaining. The posterior alveolar bone of the lower jaw was relatively flat, and there was enlargement of the maxillary tuberosity. The patient reported no relevant systemic diseases. The patient sought prosthetic rehabilitation to restore chewing function and improve aesthetics. It was concluded that a combination of a metal framework, functional impressions using a modified impression technique, and carefully designed lingual occlusion together provide optimal tissue support, stability, and load distribution, as well as prevention against the development of Kelly Syndrome.
Keywords: Kelly's Syndrome; single complete denture; metal frame; altered cast

ABSTRACT
Rehabilitasi rahang atas yang edentulus yang berkontak dengan gigi rahang bawah alami menimbulkan tantangan prostodontik unik akibat distribusi beban yang tidak merata. Jika tidak dikelola dengan baik, ketidakseimbangan biomekanik ini dapat menyebabkan Sindrom Kelly. Seorang wanita berusia 55 tahun datang ke Rumah Sakit Gigi Universitas Hasanuddin dengan keluhan utama sulit mengunyah dan penurunan kepercayaan diri akibat kehilangan banyak gigi tetapi belum pernah menggunakan gigi tiruan. Pemeriksaan intraoral, RA edentulus totalis dan kehilangan gigi posterior pada RB, tersisa 33, 32, 31, 41, 42, 43. Tulang alveolar RB bagian posterior relatif datar, dan pembesaran tuberositas maksila Pasien tidak melaporkan penyakit sistemik yang relevan. Pasien mencari rehabilitasi prostetik untuk memulihkan fungsi mengunyah dan meningkatkan estetika. Disimpulkan bahwa kombinasi kerangka logam, cetakan fungsional melalui teknik cetakan yang dimodifikasi, dan oklusi lingual yang dirancang dengan cermat secara bersama-sama memberikan dukungan jaringan optimal, stabilitas, dan distribusi beban, serta pencegahan terhadap perkembangan Sindrom Kelly.
Kata kunci: Sindrom Kelly; *single complete denture*; kerangka logam; *altered cast*
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INTRODUCTION

Patients rehabilitated with a maxillary single complete denture (SCD) opposing natural mandibular teeth pose distinct prosthodontic challenges. Differences in how removable dentures and natural teeth transmit occlusal forces, and in their support and retention, can predispose to complications if not carefully managed.[1,2]

One of the most important clinical complications in this scenario is *combination syndrome* (also known as Kelly's Syndrome). First described by Kelly in 1972, it refers to a characteristic pattern of changes that develops when an edentulous maxilla opposes intact mandibular anterior teeth. Typical findings include: anterior maxillary ridge resorption, overgrowth of maxillary tuberosities, papillary hyperplasia of the hard-palate mucosa, supraeruption of mandibular anterior teeth, and alveolar bone loss with reduced ridge height beneath the base of a mandibular removable partial denture.[3,4]

When a maxillary SCD opposes natural mandibular teeth, typical tissue changes can occur. Lack of posterior support and anteriorly concentrated forces may speed up anterior mandibular ridge resorption and related problems.[5] Recent studies show anterior hyperfunction drives these changes, so precise occlusal control and well-designed prostheses are essential.[6]

Preventive strategies are therefore critical in patients at risk of Kelly's Syndrome. Beyond even force distribution**,** implant-assisted support, and structured planning with regular follow-up, choose an occlusal scheme that limits lateral shear.[5] This case report presents a clinical approach to fabricating a maxillary SCD opposing natural mandibular teeth, with a particular focus on preventing Kelly's Syndrome. Through detailed examination, structured treatment planning, and principled prosthesis design, the case highlights strategies to minimise adverse biomechanical effects and preserve oral structures in the long term.

CASE

A 55-year-old woman presented to the Hasanuddin University Dental Hospital with chief complaints of difficulty chewing and reduced self-confidence due to extensive tooth loss. Intraoral examination revealed a completely edentulous maxillary arch and posterior tooth loss

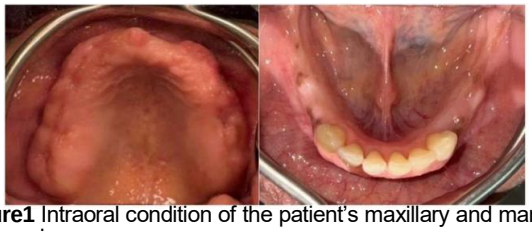

Figure1 Intraoral condition of the patient's maxillary and mandibular arches.

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in the mandibular arch, with the remaining teeth 33, 32, 31, 41, 42, 43. The posterior mandibular alveolar ridge was relatively flat, and the patient exhibited enlarged maxillary tuberosities. She had never worn dentures and reported no relevant systemic disease. The patient sought prosthetic rehabilitation to restore masticatory function and improve esthetics (Fig.1).

Management

At the first visit, the patient underwent anamnesis, extraoral and intraoral examinations, panoramic radiography, and photographic documentation. Pre-prosthetic treatment included scaling of both arches, followed by anatomical impressions using irreversible hydrocolloid (Hygedent). The impressions were poured with type II Dental Stone (Pro-Dental) to obtain study cast. The mandibular model was surveyed to assess guiding planes and design the metal framework. Both casts were then sent to the laboratory for fabrication of individual trays for the maxillary and mandibular arches.

Second visit, occlusal rest preparations were performed, followed by border molding and physiologic impressions for both the maxillary and mandibular arches with polyvinyl siloxane (Fig.2).

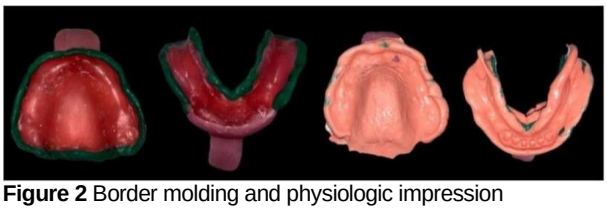

Figure 2 Border molding and physiologic impression

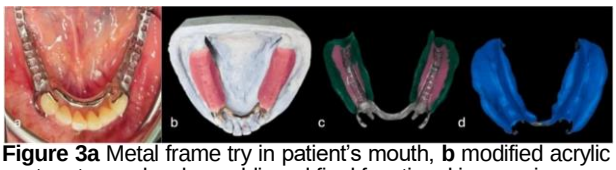

Figure 3a Metal frame try in patient's mouth, **b** modified acrylic custom tray, **c** border molding, d final functional impression

Third visit, a try-in of the mandibular metal framework was performed (Fig.3a). A functional impression was then planned using a modified acrylic custom tray attached to the framework (Fig.3b). On the master cast, a thin wax spacer was placed over the edentulous areas to create relief for the impression material, while wax was removed from the retention zones to maintain mechanical interlock between the acrylic base and the metal framework. The frame with the acrylic tray was seated intraorally, followed by border molding to establish physiologic peripheral extensions (Fig.3c). The final functional impression was completed with polyvinyl siloxane (Fig.3d).

In the laboratory, an altered cast was fabricated by sectioning the master cast distal to the terminal abutment and extending the cut perpendicularly toward the edentulous ridge to the medial lingual vestibule. The retention grooves were created on the sectioned surface, the framework with the impression was repositioned, beaded and boxed, and the impression was poured with dental stone to obtain the altered cast, improving adaptation and support of the distal-extension base (Fig.4).

Fourth appointment, the maxillary bite rim was adjusted for proper alignment, and measurements of the vertical dimension at rest and centric relation were recorded. The tooth shade and mould were selected according to the patient's facial form, gender, and remaining teeth. The case was then sent to the dental laboratory for tooth arrangement. The lingualized occlusion concept was used, with the lingual cusps of the maxillary posterior teeth contacting the central fossae of the mandibular antagonists to direct occlusal forces axially and minimize shear stress. Anterior guidance was kept shallow, with light contact in centric occlusion, to prevent tipping of the denture base during functional and excursive movements.

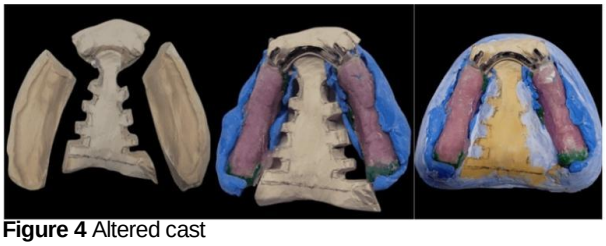

Figure 4 Altered cast

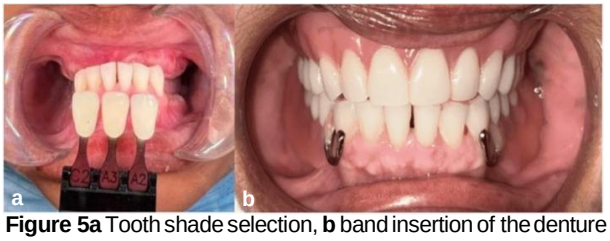

Figure 5a Tooth shade selection, **b** band insertion of the denture

After the tooth arrangement was completed in the laboratory, a try-in procedure was carried out to evaluate esthetics, occlusion, and phonetics. The dentures were then returned to the laboratory for acrylic processing, including packing, curing, finishing, and polishing, followed by selective remounting and occlusal refinement. The final prostheses were then inserted (Fig.5), and the occlusion, articulation, retention, and stability were carefully evaluated intraorally. The patient was instructed to begin chewing with soft foods, to remove the dentures before sleeping, clean them regularly using a denture cleanser, and store them in a moist container when not in use. Regular follow-up visits every six months were advised to monitor adaptation and tissue health.

Figure 6a Before and **b** after treatment with removable denture

DISCUSSION

Kelly's Syndrome typically occurs when a fully edentulous maxilla opposes a partially edentulous mandible retaining anterior teeth. It is characterised by pronounced anterior maxillary ridge resorption, accompanied by

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a combination of hypertrophic and atrophic changes across the maxillary and mandibular quadrants.[6] Continuous occlusal loading from natural teeth onto the opposing edentulous alveolar bone promotes progressive bone loss, while alveolar hypertrophy and extrusion of opposing teeth may develop in edentulous segments processes that often progress simultaneously.[7] In this case, the primary treatment objective was to prevent the development of Kelly's Syndrome by minimising occlusal pressure on the anterior maxillary mucosa and establishing stable, balanced occlusion with optimal load distribution across both hard and soft tissues.

Accordingly, preventive strategies are essential to maintain balanced occlusal forces and limit further ridge resorption. In addition to even force distribution and periodic follow-up, careful tooth selection and arrangement are crucial. Artificial teeth with low cusp inclination, such as lingualized or monoplane forms, reduce horizontal stress and denture displacement. The lingualized occlusal scheme, where maxillary lingual cusps contact mandibular central fossae, directs forces vertically and improves stability, while shallow anterior guidance and a narrow occlusal table minimise tipping, particularly on resorbed ridge,[8,9] In the anterior region, maintaining a slight overjet (1-2 mm) with minimal overbite prevents excessive loading of the maxillary ridge. Posterior teeth should be arranged directly over the crest of the ridge to ensure vertical force transmission and limit anterior denture movement.[10]

Consistent with these preventive strategies, recent studies have confirmed the benefits of lingualized occlusion and light anterior contact in maintaining denture stability and minimising shear stress. In a double-blind randomized clinical trial, Kawai et al, found that patients with severely resorbed mandibular ridges reported significantly higher comfort and satisfaction when treated with lingualized occlusion compared with bilateral balanced schemes.[9] Similarly, Wang et al. demonstrated that dentures with lingualized occlusion achieved more vertical force distribution and better functional stability, though with slightly greater artificial tooth wear over 12 months. These findings support the use of shallow anterior guidance and controlled anterior contact to prevent excessive loading on the maxillary ridge and reduce the risk of Kelly's Syndrome.[11]

In this case, using a metal framework for the denture base provided greater comfort since it can be fabricated thinner and narrower while remaining rigid. This allows for an ideal framework design and more effective masticatory force transmission, though its main drawback lies in aesthetic limitations, as portions of the metal may be visible intraorally.

Consistent with this case, recent studies have shown that incorporating metal frameworks in denture bases improves functional efficiency and patient comfort. Tiwari et al. reported that metal-reinforced bases allow for thinner, stronger designs that enhance load transfer and patient adaptation.[12] Similarly, Mohammed et al. found that cobalt–chromium palatal bases offer superior adaptation and retention compared to acrylic bases, owing to their dimensional stability and resistance to deformation under functional loads.[13] However, several authors have also noted that metal components may compromise aesthetics, especially in maxillary dentures with high smile lines, emphasising the importance of balancing biomechanical performance and visual harmony.[14]

A special impression technique, such as the altered-cast method, helps reduce functional pressure on the ridge and improves support in edentulous areas. This technique records mucosal tissues under controlled functional conditions, allowing the base to extend appropriately and achieve maximum support without tissue distortion or excessive compression. For distal-extension partial dentures, the altered-cast technique enhances base adaptation and stress distribution. After confirming the framework fit, border molding and a functional or selective-pressure impression (using zinc oxide eugenol or elastomeric material) are performed to record tissues under functional load, improving long-term support and stability.[15,16] Having optimised tissue support through the altered-cast procedure, attention must then shift to the occlusal design, since load direction and balance ultimately determine whether these mechanical advantages are preserved over time.

It is concluded that the combination of a metal framework, functional impression through the altered-cast technique, and a carefully designed lingualized occlusion collectively provided optimal tissue support, stability, and load distribution. This comprehensive approach effectively minimized the anterior maxillary stress, maintained functional balance, and served as a preventive strategy against the progression of Kelly's Syndrome.

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