Received: 15 March 2023 | Revised: 21 April 2023 | Accepted: 24 April 2023

DOI: 10.1002/ccr3.7335

CASE REPORT

Clinical Case Reports Open Access WILEY

Managing class III jaw relations

Shahad T. F. Alhazmi[1] | **V. T. Abdurahiman**[2]

[1]Dental Intern, Ibn Sina National Collage, Jeddah, KSA

[2]Department of Prosthodontics, Ibn Sina National Collage, Jeddah, KSA

Correspondence
Shahad T. F. Alhazmi, Department of Prosthodontics, Ibn Sina National College of Medical Studies, Jeddah, KSA.
Email: shahad.t.alhazmi@gmail.com

Key Clinical Message

The article describes the treatment of a patient with a class III ridge relation who required a complete denture. An artificial dentition cross-arch configuration was used to treat the patient. The dentist should relate the biomechanical component to the anatomy.

Abstract

Complete edentulism is not uncommon in day-to-day prosthodontic clinical practice. Retention and stability are critical factors in successfully treating a complete denture patient. A practitioner must always plan the treatment depending on various situations encountered in the patient's mouth. Maxillomandibular relation, which involves deviation from everyday situations, occurs with considerable frequency and is often quite challenging to the dentist in offering a suitable treatment. The importance of teeth arrangement and a stable occlusion in maintaining the stability of a denture is well-documented. This Article highlights a case with a class III jaw relation situation, which was managed successfully by a cross-arch arrangement of artificial teeth. A follow-up, along with an indication, is represented.

KEYWORDS

class III, cross-arch setup, edentulous, jaw relation, occlusion, prognathic, teeth arrangement

1 | INTRODUCTION

Edentulism is a common finding in young and old patients. Over the past few years, the frequency of edentulism has drastically declined.[1] However, compared to high-income populations, the trend of edentulism is still more in low- and middle-income populations.[2] The success of a complete denture lies not only in one factor but in many factors like retention, stability,[3] support, and esthetics.[4] To construct a removable prosthesis, the dentist must understand the correlation between the factors and procedures. There are many situations where we get a patient with abnormal jaw relations, like maxillary prognathism (Class II) or mandibular prognathism (Class

The article highlights a case with a class III situation, which was managed successfully by a cross-arch arrangement of artificial teeth. A follow-up, along with an indication, is represented.

This statement is to clarify that both authors have seen and approved the manuscript being submitted. We warrant that the article is the author's original work. We warrant that the article has not received prior publication and is not under consideration for publication elsewhere. This research has not been submitted for Publication nor has been published in whole or in part elsewhere. We attest to the fact that both authors listed on the title page have contributed significantly to the work; Have read the manuscript; Attest to the validity and legitimacy of the data and its interpretation; And agree to its submission to *Clinical Case Reports Journal*.

This is an open access article under the terms of the Creative Commons Attribution-NonCommercial License, which permits use, distribution and reproduction in any medium, provided the original work is properly cited and is not used for commercial purposes.
© 2023 The Authors. *Clinical Case Reports* published by John Wiley & Sons Ltd.

III).[5,6] Managing these situations to get a stable denture is challenging for the dentist,[7] especially in class III jaw relation patients when the posterior mandible is wider than the posterior maxilla. The criteria set for class I or class II occlusions do not apply to the interocclusal distance, the envelope of motion, chewing stroke, tooth-to-tooth relationships, or the determinants of occlusion as in class III, which makes treating class III ridge relation patients even more challenging to achieve an excellent clinical outcome.[8] One of the main troubles a dentist will encounter is arranging the artificial teeth while doing the teeth arrangement step of denture fabrication. Attaining an excellent stable occlusion is one of the criteria for obtaining a suitable stable denture. Class III cases may, in turn, lead to the arrangement of teeth in edge-to-edge or cross-bite relations. A case is represented in which a class III relation was managed by the cross-arch setup of denture teeth.

2 | CASE REPORT

A 53-year-old male reported to the dental outpatient department at Ibn Sina National College with a chief complaint to replace his missing teeth. As usual, a routine intra-oral and extra-oral examination was carried out. His panoramic X-ray was found normal (Figure 1). His facial profile was straight. Intraoral examinations were normal except in ridge relation, which revealed a wider mandibular arch and smaller maxillary arch (Figure 2). No other abnormalities were detected. A provisional diagnosis of upper and lower completely edentulous arches with a class III ridge relation was made. The dentist explained the merits and demerits of complete denture service, and written consent was taken.

3 | PROCEDURE

Upper and lower primary impressions were made using alginate, and individualized trays were constructed using the diagnostic cast (Figure 3). The special tray was then used for border molding, followed by a secondary impression, and the master cast was obtained. Maxillomandibular relations were made using wax occlusion rims, and centric relation was recorded. After articulation, the rims were removed, and the relation was evaluated. The mandibular dental arch was wider than the maxillary arch. The dental laboratory was asked to make teeth arrangements. The laboratory technician arranged the anterior tooth in an edge-to-edge relation. However, he could not get a proper posterior arrangement as it was going in cross-bite relation (Figure 4). The technician was then asked to reset the teeth in cross-arch relation (interchanging the upper posteriors to contra lateral lower posteriors), and a good occlusion was obtained (Figure 5). The try-in was done, and patient approval was taken (Figure 6). The dentures were processed (Figure 7)

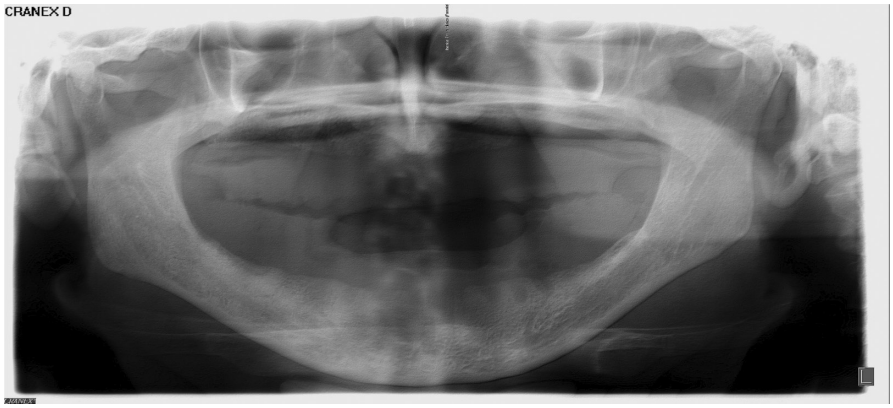

FIGURE 1 Panoramic X-ray.

FIGURE 2 Maxillary and mandibular arches.

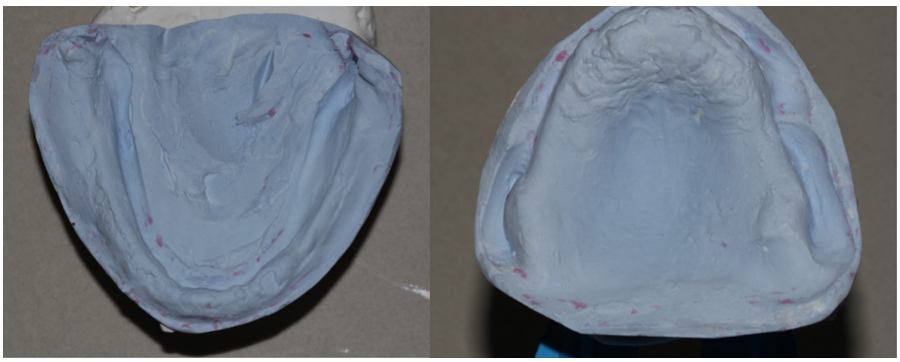

FIGURE 3 Maxillary and mandibular casts.

FIGURE 4 Side view of the cross-bite relation.

FIGURE 5 Frontal and side view of teeth in cross-arch relation.

FIGURE 6 Try-in in patient mouth.

and inserted (Figure 8). A recall checkup was done after 24 h, 72 h, 1 week, and 1 month. The patient was satisfied with his denture.

4 | DISCUSSION

Maxillomandibular relations, which involve deviations from the normal, occur with considerable frequency and often are associated with challenging diagnostic and treatment problems. Patients may present with various ridge relations, which depend mainly on the type and character of their skeletal jaws and the time-dependent phenomenon, the residual ridge resorption.[9] Regardless of the nature or magnitude of the abnormality, all treatment procedures are based on the same fundamental considerations of anatomy, physiology, and other sciences related to the chewing mechanism. The arrangement of teeth for different situations is documented. Many states stated the biomechanical importance of placing posterior teeth in prognathic patients.[6,7,10] There are many ways to tackle a class III jaw

FIGURE 7 Dentures processed.

FIGURE 8 Dentures insertion.

relation situation. Some include cross-bite setting removal of one tooth to adjust the space.[11] A class III ridge relation case managed by cross-arch set is documented here. The cross-arch setting is the technique where the upper posterior teeth and lower posterior teeth are interchanged, each other with contralateral sides.[12] The name "cross-arch arrangement" comes from the fact that both the arch and the side of the teeth interchange in this form of arrangement.[13]

These may be indicated to obtain a stable occlusion, especially if the deviation of the arch is more in lateral magnitude. Tambe et al. in 2014 reported a case of class III jaw relation with oral sub-mucous fibrosis, where he managed the case using the cross-arch setting technique.[13] The arrangement of artificial teeth is considered to be an art based on biomechanical factors.[14] Occlusion should be developed to function efficiently with the least trauma to supporting tissues, whether in normal or abnormal jaw relations.[15] Researchers have not revealed any superior form of tooth arrangement in a particular patient. Therefore, it is always important to know the various situations that may require a dentist to deviate from the standard principles of tooth arrangement.

5 | CONCLUSION

The article presents the management of a class III ridge relation patient who needed a complete denture. The case was treated using a cross-arch setup of artificial dentition. The patient was further surveyed for his satisfaction with retention and stability, and he was found to be happy. Whether this arrangement applies to all patients or do not need further clinical documentation is beyond the scope of this article. However, a dentist should always correlate the anatomy with the biomechanical factors while fabricating the denture. The teeth arrangement step of denture fabrication is the primary challenge, but it is one of the requirements for getting a suitable stable denture.

AUTHOR CONTRIBUTIONS

Shahad T. F. Alhazmi: Data curation; investigation; resources; writing – review and editing. **V. T. Abdurahiman:** Supervision; writing – original draft.

CONFLICT OF INTEREST STATEMENT

All authors have no conflict of interest.

CONSENT

Written informed consent was obtained from the patient to publish this report in accordance with the journal's patient consent policy.

ORCID

Shahad T. F. Alhazmi https://orcid.org/0009-0008-2112-2804

REFERENCES

1. Tyrovolas S, Koyanagi A, Panagiotakos DB, et al. Population prevalence of edentulism and its association with depression and self-rated health. *Sci Rep*. 2016;6:37083. doi:10.1038/srep37083
2. Peltzer K, Hewlett S, Yawson AE, et al. Prevalence of loss of all teeth (edentulism) and associated factors in older adults in China, Ghana, India, Mexico, Russia and South Africa. *Int J Environ Res Public Health*. 2014;11(11):11308-11324.
3. Jacobson TE, Krol AJ. Contemporary review of the factors involved in complete dentures. Part II: stability. *J Prosthet Dent*. 1983;49(2):165-172.
4. Ortman HR. The role of occlusion in preservation and prevention in complete denture prosthodontics. *J Prosthet Dent*. 1971;25(2):121-138.
5. Goyal BK, Bhargava K. Arrangement of artificial teeth in abnormal jaw relations: maxillary protrusion and wider upper arch. *J Prosthet Dent*. 1974;32(1):107-111.
6. Goyal BK, Bhargava K. Arrangement of artificial teeth in abnormal jaw relations: mandibular protrusion and wider lower arch. *J Prosthet Dent*. 1974;32(4):458-461.
7. LaVere AM, Freda AL. Artificial tooth arrangement for prognathic patients. *J Prosthet Dent*. 1972;28(6):650-654.
8. Jensen WO. Occlusion for the Class III jaw relations patient. *J Prosthet Dent*. 1990;64(5):566-568. doi:10.1016/0022-3913(90)90129-z
9. Zarb H, Eckert J. *Prosthodontic treatment for edentulous patients: complete denture and implant supported prostheses*. 13th ed. Elsevier Mosby.
10. Becker CM, Swoope CC, Guckes AD. Lingualized occlusion for removable prosthodontics. *J Prosthet Dent*. 1977;38(6):601-608.
11. LaVere AM, Freda AL. Arrangement of artificial teeth for prognathic patients. *Dent Labor*. 1973;21(12):1303-1304.
12. Frechette AR. Prosthetic restorations associated with abnormal jaw relations. *J Am Dent Assoc*. 1958;57(2):210-220.
13. Tambe A, Patil SB, Bhat S, Badadare MM. Cross-arch arrangement in complete denture prosthesis to manage an edentulous patient with oral submucous fibrosis and abnormal jaw relation. *BMJ Case Rep*. 2014;2014:bcr2013203065.
14. Morrow RM, Rudd KD, Rhoads JE. *Dental laboratory procedures: Complete dentures*. Vol 1. The C. V. Mosby Co.; 1986.
15. Rangarajan V, Gajapathi B, Yogesh PB, Mohamed Ibrahim M, Ganesh Kumar R, Karthik P. Concepts of occlusion in prosthodontics: A literature review, part I. *J Indian Prosthodont Soc*. 2015;15(3):200-220.

How to cite this article: Alhazmi STF, Abdurahiman VT. Managing class III jaw relations. *Clin Case Rep*. 2023;11:e07335. doi:10.1002/ccr3.7335