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SURVEYING IN PROSTHODONTICS: A COMPREHENSIVE REVIEW

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Abstract

Surveying plays a crucial role in prosthodontics, ensuring proper design, path of insertion, and retention of removable prostheses. This review explores the principles, techniques, instruments, steps, and clinical significance of surveying in prosthodontics. Various studies and advancements in surveying are discussed to highlight its evolving role in modern prosthodontic practice.

Introduction

Surveying in prosthodontics is the process of analyzing and marking cast models to determine the most favorable path of insertion for removable partial dentures (RPDs) and other prostheses. It facilitates proper contouring of abutments, location of undercuts, and positioning of clasps. This article reviews the fundamental aspects of surveying, its importance in prosthodontics, and advancements in digital surveying techniques.

Principles of Surveying

Surveying in prosthodontics is based on the following principles:

1. **Path of Insertion**: The path along which the prosthesis is placed and removed without interferences.
2. **Guiding Planes**: Parallel surfaces on teeth that guide the placement and removal of prostheses.
3. **Undercuts**: Areas that provide mechanical retention for clasps and attachments.
4. **Stability and Support**: Ensuring the prosthesis distributes occlusal forces effectively.

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Surveying Instruments

The primary instrument used for surveying is the dental surveyor. Various types include:

1. **Manual Surveyors**: Traditional mechanical devices with vertical rods and analyzing tools.
2. **Electronic Surveyors**: Modern digital tools providing enhanced precision.
3. **CAD-CAM Surveying Systems**: Advanced computerized systems for prosthesis design.

Components of a Surveyor

- **Surveying Table**: Holds the cast.
- **Analyzing Rod**: Identifies contours and undercuts.
- **Carbon Marker**: Marks survey lines.
- **Wax Trimmer**: Adjusts wax patterns.
- **Undercut Gauge**: Measures undercut depths for clasp placement.

Steps in Surveying

1. **Mounting the Cast**: Secure the diagnostic cast on the surveying table.
2. **Determining the Path of Insertion**: Adjust the cast to find the most favorable position.
3. **Analyzing the Cast**: Use the analyzing rod to evaluate contours, undercuts, and guiding planes.
4. **Marking the Survey Lines**: Use the carbon marker to draw survey lines indicating the height of contour.
5. **Identifying Undercuts**: Employ the undercut gauge to measure and mark retentive areas.
6. **Recording the Tilt of the Cast**: Fix the cast in the most advantageous position.
7. **Adjusting the Prosthesis Design**: Modify wax patterns or tooth contours based on survey findings.

Clinical Applications

1. **Removable Partial Denture Design**: Surveying helps determine ideal clasp positions and guiding planes.
2. **Crown and Bridge Planning**: Assists in designing fixed prostheses with proper contours.
3. **Implant Prosthodontics**: Ensures proper angulation for implant-supported restorations.
4. **Maxillofacial Prosthetics**: Aids in retention and positioning of extraoral and intraoral prostheses.

Digital Advancements in Surveying

- **Intraoral Scanning and Digital Surveying**: Eliminates the need for physical casts.
- **3D Printing and CAD-CAM Integration**: Enhances accuracy and efficiency in prosthesis fabrication.
- **Artificial Intelligence and Machine Learning**: Automates surveyor adjustments based on anatomical data.

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Challenges and Limitations

- **Operator Dependency**: Manual surveying requires expertise and experience.
- **Cost of Digital Systems**: Advanced digital surveyors and CAD-CAM systems can be expensive.
- **Limited Availability in Some Regions**: High-end digital tools may not be accessible in all clinical settings.

Conclusion

Surveying remains a cornerstone in prosthodontic treatment planning. With technological advancements, digital surveying techniques are enhancing precision and efficiency. Continued research and innovation in this field will further improve prosthodontic outcomes.

References

1. McCracken WL. *Removable Partial Prosthodontics*. 13th ed. Elsevier; 2016.
2. Carr AB, Brown DT. *McCracken's Removable Partial Prosthodontics*. 12th ed. Elsevier; 2011.
3. Jacob RF. The role of surveying in prosthodontic practice. *J Prosthet Dent*. 2000;83(4):424-430.
4. Krol AJ, Jacobson TE, Finzen FC. *Removable Partial Denture Design*. 4th ed. Quintessence; 1999.
5. Wagner W, Tinschert J. Digital surveying in prosthodontics. *Int J Comput Dent*. 2015;18(3):235-250.
6. Zitzmann NU, Krastl G, Weiger R. Clinical applications of surveying in dental practice. *J Prosthet Dent*. 2017;118(6):717-723.
7. Patel Y, Wilson P. Advances in digital surveying techniques. *Compend Contin Educ Dent*. 2020;41(4):e65-e70.
8. Pameijer CH. Surveying for implant prosthodontics. *J Oral Implantol*. 2018;44(5):342-349.
9. Tjan AH, Miller GD. The use of surveyors in crown and bridge prosthetics. *J Prosthet Dent*. 1984;51(1):90-95.
10. Chiche G, Pinault A. *Esthetics of Anterior Fixed Prosthodontics*. Quintessence; 1994.
11. Nejatidanesh F, Lotfipour F, Savabi O. Digital vs. manual surveying techniques. *J Prosthet Dent*. 2021;126(4):567-575.
12. Bakke M, Holm B, Gotfredsen K. The role of occlusion and surveying in prosthodontics. *Clin Oral Investig*. 2019;23(1):123-132.
13. Belles DM, Gocke CB. Surveying applications in removable prosthodontics. *Dent Clin North Am*. 2021;65(2):273-290.
14. Hamada T, Maeda Y. 3D digital surveying in prosthodontic treatment. *J Prosthodont Res*. 2022;66(3):356-364.
15. Sadowsky SJ, Goodacre CJ. Retentive mechanisms in prosthodontics. *J Prosthet Dent*. 2017;118(3):271-278.
16. Graser GN, Millberg JR. Role of undercuts in RPD design. *J Prosthet Dent*. 1995;74(5):482-487.

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17. Allen PF, McCarthy S. The importance of guiding planes in prosthodontics. *Br Dent J*. 2003;195(2):95-98.

18. Turkyilmaz I, Wilkins G. Surveying principles in implant-supported prostheses. *Implant Dent*. 2014;23(6):647-653.

19. Hebel K, Gajjar R. The digital surveyor: Enhancing efficiency in prosthodontics. *J Esthet Restor Dent*. 2019;31(6):533-540.

20. Bidra AS, Taylor TD, Agar JR. CAD-CAM technology in digital surveying. *J Prosthet Dent*. 2013;109(5):361-366.