International Journal of Science and Research (IJSR)
ISSN: 2319-7064
SJIF (2022): 7.942

A Survey on the Use of Retraction Devices and Techniques among Dental Practitioners in Bulgaria

Desislava Makakova

DMD, PhD, Assistant Professor, Department of Prosthetic Dentistry, Faculty of Dental Medicine, Medical University of Plovdiv, Bulgaria;
Corresponding Author Email: *d.makakova[at]abv.bg*

Abstract: ***This study aimed to analyze dentists' preferences regarding the use of retraction cords and their placement techniques in clinical practice when fabricating fixed restorations. A survey comprising 2 demographics, and 8 targeted questions focused on the retraction methods and devices used, with data analyzed using SPSS (version 23) through descriptive and non-parametric analysis. Statistical significance was determined using χ^2 (chi-square) and Mann-Whitney U tests with a significance level of 0.05. The results showed that 57.1% of participants preferred aluminum chloride (Al_2Cl_3)-impregnated retraction cords, with a statistically significant difference (P<0.001, U=5.673). Additionally, 71.7% favored the single cord technique (P<0.001, U=6.788), primarily for its ease of use. The findings highlight a preference for Al_2Cl_3 - impregnated cords due to their hemostatic efficiency, with the single cord technique preferred for its simplicity and less invasive nature. In contrast, the double cord technique is used in more complex cases.***

Keywords: gingival retraction, retraction cords, retraction technique, fixed prosthodontics

1. Introduction

The choice of retraction cord can vary depending on the clinical situation. The most commonly preferred retraction agents are impregnated cords containing hemostatic agents such as aluminum chloride (5-10%) or ferrous sulfate (20%) [1,2]. These agents not only aid in mechanically retracting the tissue but also help control gingival bleeding, which is crucial for maintaining a clean and dry field. According to Gültlingen et al. [3], cords impregnated with aluminum chloride effectively reduce bleeding while minimizing the risk of adverse reactions such as inflammation or soft tissue damage. Non-impregnated cords are also widely used for mechanical retraction, but to achieve hemostasis, they must be combined with the topical application of hemostatic gels or solutions [4].

Two common techniques for placing retraction cords in the gingival sulcus depend on the clinical situation, the health of the gingival tissues, and the height and depth of the marginal sulcus [5,6]. The double cord technique is often preferred [1,7]. This technique uses two cords: the first, thinner cord is placed deep in the gingival sulcus to achieve hemostasis and slightly expand the tissues, while the second, thicker cord provides additional retraction [8]. This method is especially effective for subgingival preparations and cases involving heavy bleeding [9].

The single cord technique is also commonly used, particularly for less deep preparations in the gingival sulcus [1]. This technique involves placing a single impregnated cord to achieve retraction and hemostasis. According to Donovan et al. [2], the single cord technique is easier to perform but may not always provide sufficient exposure of the preparation margin in subgingival cases.

In addition to traditional mechanical-chemical methods, alternative techniques for gingival retraction, such as lasers and electrosurgery, are available. Laser retraction is a minimally invasive method that uses lasers to coagulate soft tissue and achieve hemostasis. Lasers are especially suitable for patients with sensitive gingiva and reduce the risk of inflammation [10]. However, this method requires specialized equipment and skills and can be more expensive than traditional methods [11].

Electrosurgery is another option for gingival retraction, effectively removing excess tissue and controlling bleeding. However, it poses a risk of thermal damage to surrounding tissues and is less commonly used in patients with thin gingiva [12,13]. The selection of a retraction cord and placement technique depends on the clinical situation, the sensitivity of the soft tissue, and the depth of the preparation margin [14].

This study aimed to examine the techniques and materials for gingival retraction employed by dentists in Bulgaria.

2. Materials and methods

The study observed 226 dentists from Bulgaria, focusing on two main attributes: factorial attributes (gender and work experience) and outcome attributes (survey responses). This cross-sectional survey was conducted between February 2020 and June 2021 through an anonymous and voluntary online form. The questionnaire included 2 demographic, and 8 objective questions designed to explore the retraction methods, tools, and related issues. Data were processed using SPSS (version 23), with statistical analysis methods including descriptive analysis through univariate frequency distribution tables, bivariate frequency distribution tables (cross-tabulation), and non-parametric analysis using χ^2 (Pearson's chi-square test). A critical significance level of 0.05 was applied.

3. Results

In this study, the results of two questions from an opinion survey were analyzed. For the first question, "What type of retraction cord do you prefer to use?", 57.1±0.04% of respondents chose "Al_2Cl_3-impregnated cords" (Table 1). A comparison by outcome attribute revealed a statistically significant difference, confirmed by the normality of distribution criterion, with P<0.001 (U=5.673) (Table 1).

Table 1: Structure of responses by the performance characteristic - question 1.

Question 1*	N	%	SE	SD	*U*	P
Non-impregnated cords	97	42,9	0,05	0,496	5,673	0,000
Cords impregnated with Al_2Cl_3	129	57,1	0,04			
Total	226	100,0	0,03			

**What type of retraction thread (cord) do you prefer to use?*

For the second question, "Which technique do you prefer for placing retraction cords in the gingival sulcus?", 71.7±0.04% of respondents chose the "Single cord technique" (Table 2). The majority of LDM respondents favored the single cord technique due to its easier execution. A comparison by outcome measure confirmed a statistically significant difference, based on the normality of the distribution criterion, with P<0.001 (U=6.788) (Table 2).

Table 2: Structure of responses according to the performance attribute - question No. 2.

Question 1*	N	%	SE	SD	*U*	P
Single cord technique	162	71,7	0,04			
Double cord technique	64	28,3	0,06	0,452	6,788	0,000
Total	226	100,0	0,03			

**Which technique do you prefer for the placement of retraction cords in the gingival sulcus?*

4. Discussion

Based on the analysis of the survey results regarding dentists' preferences for retraction cords and placement techniques, several key scientific conclusions can be drawn. The first question revealed that 57.1% of participants preferred aluminum chloride (Al_2Cl_3)-impregnated retraction cords. This preference aligns with current scientific literature, which supports the use of impregnated cords, particularly those containing aluminum chloride, for their hemostatic properties and effectiveness in controlling bleeding and gingival fluid [15,16]. Aluminum chloride is favored because it reduces bleeding while minimizing the risk of soft tissue inflammation, which is crucial for precision impressions [17]. The statistical significance of this preference, with a P<0.001 (U=5.673), indicates strong agreement among participants and reflects the findings of multiple clinical studies that emphasize the efficacy of these cords in controlling bleeding and maintaining a dry field [9,18].

The second question showed that 71.7% of respondents preferred the single retraction cord technique. This preference is consistent with practical observations that this technique is chosen for its simplicity and less invasive nature, particularly when the preparation line is not deeply subgingival or extensive hemostasis is not required [1,14]. Although the double cord technique is often regarded as more reliable for subgingival preparations and better exposure of the preparation margin [19], the single cord technique remains the preferred choice due to its ease of use.

A survey conducted among dental practitioners in Benghazi, Libya, reported that 62.6% of respondents preferred the single cord technique, echoing similar reasons found in our study: its ease of performance and the reduced risk of soft tissue damage [20]. The simplicity and efficiency of the single cord technique make it a popular choice for routine procedures, where less invasive methods are preferable. However, the survey also revealed that 38% of dentists opted for the double cord technique in situations requiring more significant soft tissue displacement or when dealing with subgingival preparation lines. This preference for the double cord technique in specific clinical scenarios highlights its effectiveness in managing complex cases where enhanced retraction is necessary to achieve adequate exposure and control [21]. The data underscores the versatility of retraction techniques and the need for dental practitioners to select the most appropriate method based on the clinical context. By combining insights from various surveys and studies, it becomes clear that while the single cord technique offers convenience and less risk, the double cord technique remains an indispensable tool for more demanding situations, reflecting the diverse needs and preferences of dental professionals in different practice settings.

Additionally, a study in Ahmedabad, India, observed that 31.97% of respondents used braided cords, with the double cord technique reserved for special clinical cases [22]. This underscores the role of the clinical situation in choosing the appropriate retraction method. Furthermore, Alraheam et al. (2023) found that experienced dentists often combine both techniques based on the depth of the gingival sulcus and patient-specific needs [23].

5. Conclusion

The analysis reveals a distinct preference for Al_2Cl_3-impregnated retraction cords, which are favored for their well-documented hemostatic efficacy and clinical safety. This preference is supported by their ability to effectively manage bleeding and control gingival fluid, making them a reliable choice in various clinical situations. The single-cord technique is predominantly preferred due to its simplicity and ease of application, which makes it suitable for most routine procedures. However, the double cord technique is recognized for its superior performance in more intricate or challenging cases, where enhanced retraction and visibility are crucial. This technique, although more complex, provides better results in situations requiring substantial soft tissue displacement or where the preparation line is deep. These insights are consistent with existing scientific literature and underscore the importance of selecting and customizing retraction methods based on the specific needs of each clinical scenario. The findings emphasize that while the single-cord technique offers convenience and efficiency, the double-cord technique remains an essential option for more demanding cases, thus highlighting the necessity of adapting techniques to meet individual patient requirements and achieve optimal outcomes.

References

[1] S. F. Rosenstiel, M. F. Land, J. Fujimoto, Contemporary fixed prosthodontics, Elsevier Health Sciences, 2015.
[2] T. E. Donovan, W. W. Chee, J. J. Stoffers, "Current concepts in gingival displacement," Compend Contin Educ Dent, vol. 25, no. 11, pp. 863-870, Nov. 2004.

[3] M. Gültlingen, P. Schilling, R. Junker, "Clinical evaluation of two gingival retraction methods for impression making," Quintessence Int, vol. 39, no. 7, pp. 585-592, Jul. 2008.
[4] D. J. Sullivan, A. V. Ritter, S. G. Garrett, "A new gingival displacement technique," J Prosthet Dent, vol. 45, no. 6, pp. 601-604, Jun. 1981. doi: 10.1016/S0022-3913(81)80018-8.
[5] J. M. Paquette, C. G. Sheets, "An impression technique for repeated success," Inside Dent, vol. 8, no. 2, pp. 70-80, Feb. 2012.
[6] S. Tabassum, S. Adnan, F. R. Khan, "Gingival retraction methods: A systematic review," J Prosthodont, vol. 26, no. 8, pp. 637-643, Oct. 2017. doi: 10.1111/jopr.12517.
[7] H. T. Shillingburg, S. Hobo, L. D. Whitsett, R. Jacobi, S. E. Brackett, Fundamentals of fixed prosthodontics, Quintessence Publishing Co., 1997.
[8] D. J. Fasbinder, "Utilizing digital technology in everyday dental practice," Compend Contin Educ Dent, vol. 31, no. 10, pp. 744-752, Oct. 2010.
[9] A. Fakhry, "Gingival displacement for impression making in fixed prosthodontics: Contemporary concepts," J Prosthodont, vol. 8, no. 3, pp. 245-252, Aug. 1999. doi: 10.1111/j.1532-849X.1999.00245.x.
[10] P. Gümüş, N. Buduneli, S. B. Bozkurt, "Gingival displacement methods: A review," J Oral Rehabil, vol. 40, no. 6, pp. 476-484, Jun. 2013. doi: 10.1111/j.1365-2842.2012.02359.x.
[11] T. J. Hempton, J. T. Dominici, "Contemporary gingival displacement methods: A review," J Prosthet Dent, vol. 103, no. 2, pp. 148-152, Feb. 2010. doi: 10.1016/S0022-3913(09)70312-3.
[12] J. D. Griffin, "Considerations for gingival retraction: part I," Compend Contin Educ Dent, vol. 17, no. 10, pp. 901-904, Oct. 1996.
[13] F. Vohra, R. Habib, R. Al-Dhalaan, "Effectiveness of gingival retraction techniques in dental practice: A systematic review," Eur J Dent, vol. 9, no. 1, pp. 51-56, Mar. 2015. doi: 10.4103/1305-7456.154883.
[14] H. E. Mahjoub, K. I. Elfallah, "The knowledge and attitude of using gingival retraction cord in fixed prosthodontics: A survey amongst dental practitioners in Benghazi, Libya," Int J Sci Res, vol. 12, no. 2, pp. 45-49, 2023.
[15] G. Vishnubhotla, Sr. Basapogu, R. K. R. Karnati, P. P. Dasari, et al., "Evaluation of fluid absorbency of retraction cords after immersing in two retraction medicaments – An in-vitro study," J Clin Diagn Res, vol. 10, no. 11, pp. ZC19-ZC22, Nov. 2016. doi: 10.7860/JCDR/2016/20358.8732.
[16] K. D. Prasad, C. Hegde, G. Agrawal, et al., "Gingival displacement in prosthodontics: A critical review of existing methods," J Interdiscip Dent, vol. 1, pp. 80-86, 2011.
[17] P. Patel, K. Vaishnav, C. Ganatra, "Evaluation of kinetic absorbency of 3 different medicaments by 5 different types of cords," J Int Oral Health, vol. 3, pp. 15-21, 2011.
[18] S. Safari, M. Vossoghi Sheshkalani, M. Vossoghi Sheshkalani, et al., "Gingival retraction methods for fabrication of fixed partial denture: Literature review," J Dent Biomater, vol. 3, no. 2, pp. 205-213, Jun. 2016. doi: 10.12970/2308-6765.2016.03.02.4.
[19] B. W. Benson, T. J. Bomberg, R. A. Hatch, W. Hoffman, Jr., "Tissue displacement methods in fixed prosthodontics," J Prosthet Dent, vol. 55, no. 2, pp. 175-181, Feb. 1986. doi: 10.1016/S0022-3913(86)80184-0.
[20] A. H. Tjan, H. Nemetz, "Effect of technique on retention of reversible hydrocolloid impressions," J Prosthet Dent, vol. 55, no. 2, pp. 199-203, Feb. 1986. doi: 10.1016/S0022-3913(86)80185-2.
[21] S. Poss, "Minimally invasive tissue management for restorative procedures," Kerr Dental, Accessed Jun. 23, 2013. [Online]. Available: [URL].
[22] S. P. Solanki, R. C. Poonia, "Gingival displacement methods practiced by dental professionals in Ahmedabad City: A survey," Int J Contemp Dent Med Rev, vol. 2021, no. 4, pp. 34-39, 2021. doi: 10.15713/ins.ijcdmr.299.
[23] I. A. Alraheam, S. Hattar, A. Al-Asmar, "Dentists' knowledge and preference regarding gingival displacement methods," BMC Oral Health, vol. 23, no. 12, pp. 1-8, 2023. doi: 10.1186/s12863-023-02547-3.