

COMPARISON OF COTTON ROLL ISOLATION VS RUBBER DAM FOR PATIENT COMFORT IN RESTORATIVE PROCEDURES

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Abstract

Objective of the Study: To evaluate the comfort of patients and several operator-related factors for isolation techniques of cotton roll and rubber dam for restorative dental treatments.

Study Design: A randomized controlled trial

Place, and Duration: Six months from November 2024 to April 2025 at the 21 Military Dental Centre (21 MDC), Quetta, Pakistan.

Methodology: A hundred and twenty subjects (68 males, 52 females; mean age 41.11 ± 8.6 years) were randomly divided into two groups, Group 1 (cotton rolled isolation, $n=60$) and Group 2 (rubber dam isolation, $n=60$). Patient and operator comfort, preference and operator-related factors (ease of application, moisture control, radiographic interference) were gauged with standardized questionnaires. The data were analyzed by using descriptive statistics and the chi-square test (SPSS 20.0, $p < .05$).

Results: where, cotton rolls were chosen by 90% compared to 81.67% in the rubber dam technique but the comfort levels was excellent in both (96.67%- cotton rolls vs 93.33%- rubber dam; $p = 0.340$). Operator evaluation showed that rubber dams provided a much superior control of the moisture (88.33% excellent, $p = 0.012$), but were inferior for taking radiographic procedures (80% excellent versus 96.67% for cotton rolls, $p = 0.004$). The clinical benefits of the rubber dams were the main reasons cited by the operator, despite cotton roll preference by the patient.

Conclusion: Patients preferred cotton rolls with respect to perceived comfort, whereas rubber dam was clinically superior in terms of moisture control and operator preference. Isolation technique should be a compromise between patient comfort and technical requirements.

INTRODUCTION

Dental isolation procedures are an integral part of restorative treatments with significant impacts both

on clinical outcome and patient comfort.¹ Cotton roll isolation and rubber dam isolation are the two

main isolation methods most frequently used with their own limitations and advantages.² Cotton rolls are inexpensive, uncomplicated and do not need to be removed during radiographic procedures, yet rubber dams control moisture better and offer better prevention against infection.³ Nonetheless, patient comfort is an important issue, since methods of isolation can impact levels of anxiety, treatment time, and overall satisfaction.⁴ As there is growing focus on patient-centered dental care, these methods need to be assessed from a comfort point of view in order to maximize clinical practice.⁵

A study by Yalçın et al., showed that 86.8% of patients felt more comfortable with rubber dam placement than with previous treatments, but this was also followed with patients complaining of swallowing or breathing difficulty (26.8%) and not being able to rinse the mouth while under treatment (30.4%) upon rubber dam placement.⁶ A cross-sectional survey among children aged 2–16 years revealed that a high percentage preferred the cotton roll isolation compared to rubber dams.⁷ This was due to the comfort and non-constrictive nature they associated with cotton rolls. Alhareky et al, in one study, found out that rubber dams took 12.4% less time (about 108 seconds) to seal fissures compared to the use of cotton rolls for isolation.⁸ But another research study by Mahima et al, revealed that although rubber dams were effective, they could result in greater anxiety among patients than other methods.⁹ In spite of these observations, there is still no agreement regarding which technique provides greater comfort and are preferred by both patients and operators without compromising on clinical efficiency.

Existing literature is primarily centered on isolation effectiveness¹⁰ and not patient-related outcomes, and comparative comfort measurements are lacking. Most studies also fail to include variables like operator comfort, moisture control, ease of application and interference with radiograph, which have significant impacts on patient perception. The present study intends to compare rubber dam isolation and cotton roll isolation based on all these variables during restorative procedures, utilizing standardized comfort scales and objective clinical measurements. The results will offer evidence-based

advice to improve both patient experience and treatment outcomes.

Methodology

A randomized control trial was conducted at the 21 Military Dental College (21 MDC), Quetta Pakistan after being approved by the Institutional Ethical Board. A convenient sampling technique was used and a sample size of 30 participants was detected for each group by the help of World Health Organization calculator. Participants were divided into two groups, a cotton roll was utilized for group-1 patients, while rubber dam was employed for group-2 patients. The study was carried out with a level of significance of 5%, power of the test 80%, and the anticipated population proportion for group-1 as 88.16 and for group-2 as 9.21%. A written and verbal consent was obtained from the patients prior to the study.

Inclusion criteria: Patients who were undergoing restorative and endodontic procedures at the hospital with an age between 18 and 60 years were selected for the study.

Exclusion criteria: Patients with health issues, severely decayed teeth with poor prognoses, or uncooperative patients were excluded from the study.

Two set questionnaires were prepared before starting the study – one for patients and one for dental professionals. The questionnaires were set based on literature that was already published and then edited to fit the aims of this study. Both sets of questionnaires were piloted before data collection started. The patient questionnaire had three sections. The first section captured personal details, such as name, age, and gender. The second part collected information about the treated tooth, the nature of restorative treatment done, and the comfort level experienced by the patient during isolation. The third part requested patients to indicate their preference for cotton roll isolation or rubber dam isolation.

Both operators and patients were queried regarding a number of determinants such as the ease and time of application, the efficacy of moisture control, the ease of radiographic taking, and their general preference between the two methods of isolation (rubber dam vs cotton rolls). Cotton rolls and standard rubber dams

were used in the study as per routine clinical procedures. Rubber dams were placed according to the manufacturer's guidelines to achieve consistency between cases. All patients were fully informed regarding the intent and benefits of isolation technique usage before treatment, and written consent was obtained from them.

The collected data was evaluated using descriptive analysis (percentages, frequency), and a chi-square test in Statistical Package for Social Sciences 20.0 was used to calculate the p-value.

Results

In this study, a total of 120 patients participated of which 68 (56.67%) were male and 52 (43.33%) were female. The mean age of the patients was 41.11 ± 8.6 years. **Table I** shows the patient-centered outcomes of patient preference and patient comfort between the two isolation methods: cotton roll isolation (Group 1) and rubber dam isolation (Group 2).

More patients in Group 1 (90%) reported a preference for cotton roll isolation than in Group 2 (81.67%). With regard to comfort, both groups had excellent comfort levels, at 96.67% for Group 1 and 93.33% for Group 2, with no statistically significant difference between the two techniques ($p > 0.05$). **Table II** depicts the comparison of operator-related factors, such as ease of application, moisture control, ease of radiograph acquisition, and operator preference, between the two groups. Cotton roll isolation (Group 1) was graded excellent for ease of placement by 100% of the operators and 95% graded rubber dam isolation (Group 2) as excellent. Ease of application was not significantly different between both groups ($p = 0.122$). Operator preference and moisture control were much better in the rubber dam ($p = 0.015$ and $p = 0.012$, respectively). Ease of radiograph was also considerably greater in the cotton roll group ($p = 0.004$).

Table I. Comparison of Patient Preference and Comfort between Cotton Roll Isolation and Rubber Dam during Restorative Procedures

Patient Determinants	Groups	Responses	Frequency (Percentage)	p - value
Patient preference	Group 1	Yes	54 (90%)	0.148
		No	6 (10%)	
	Group 2	Yes	49 (81.67%)	
		No	11 (18.33%)	
Patient comfort	Group 1	Excellent	58 (96.67%)	0.340
		Acceptable	2 (3.33%)	
		Unsatisfactory	0 (0%)	
	Group 2	Excellent	56 (93.33%)	
		Acceptable	4 (6.67%)	
		Unsatisfactory	0 (0%)	

Table II. Comparison of Operator-Related Factors (Ease of Application, Moisture Control, Ease of Radiograph, and Operator Preference) between Cotton Roll Isolation and Rubber Dam during Restorative Procedures

Patient Determinants	Groups	Responses	Frequency (Percentage)	p - value
Ease of application	Group 1	Excellent	60 (100%)	0.122
		Acceptable	0 (0%)	
		Unsatisfactory	0 (0%)	
	Group 2	Excellent	57 (95%)	
		Acceptable	3 (5%)	
		Unsatisfactory	0 (0%)	
Moisture control	Group 1	Excellent	41 (68.33%)	0.015
		Acceptable	15 (25%)	

	Group 2	Unsatisfactory	4 (6.67%)	
		Excellent	53 (88.33%)	
		Acceptable	7 (11.67%)	
		Unsatisfactory	0 (0%)	
Ease of radiograph	Group 1	Excellent	58 (96.67%)	.004
		Acceptable	2 (3.33%)	
		Unsatisfactory	0 (0%)	
	Group 2	Excellent	48 (80%)	
		Acceptable	12 (20%)	
		Unsatisfactory	0 (0%)	
Operator preference	Group 1	Yes	42 (70%)	0.012
		No	18 (30%)	
	Group 2	Yes	53 (88.33%)	
		No	7 (11.67%)	

Discussion

The findings of this study indicate that while a higher percentage of patients (90%) preferred cotton roll isolation over rubber dam isolation (81.67%), both methods provided excellent comfort levels (>93%) with no significant difference. Operator-related factors revealed that cotton rolls were easier to apply and facilitated radiograph acquisition, whereas rubber dams offered superior moisture control and were the preferred choice among operators for these advantages.

A comparative analysis with recent literature supports these findings. Goel & Barjatya (2023) similarly found that 88% of patients preferred cotton rolls for comfort, closely aligning with our results (90%). However, their study also noted that rubber dams provided significantly better moisture control ($p < 0.05$), which corresponds with our operator assessments ($p = 0.012$). The systematic review by Tiwari et al. reinforced that rubber dams remain the gold standard for isolation in restorative procedures due to superior infection control and moisture management.

Interestingly, a study by Miao et al., reported no significant difference in restoration longevity between the two methods, suggesting that operator skill may be more critical than the isolation technique itself. This contrasts slightly with Olegário et al.'s 2-year clinical trial which reported marginally better survival rates for composite restorations using rubber dams in pediatric patients. Regarding radiography interference, our findings align with

Mackenzie et al. who noted rubber dams can complicate radiographic positioning, explaining why 100% of operators in our study rated cotton rolls superior for this parameter.

Rubber dams provide superior moisture control, enhance visibility, and retract soft tissues, facilitating precise work. An investigation by Jonas & Reid, has emphasized the need for rigorously controlled moisture for success in operative dentistry and that rubber dam being an effective moisture control medium is essential for success. Furthermore, rubber dams reduce the risk of contamination, allowing restorations to last longer. A study by Akbar et al., observed that 76% of dental students felt that rubber dams hindered their radiographic work, raising concerns among the professionals, which is of significant concern. This interference necessitates additional adjustments or removal of the dam, potentially prolonging the procedure. Even though the study indicates favorable preference of cotton rolls, but technically the use of rubber dams has been associated with a higher reduction in postoperative sensitivity and secondary caries, further emphasizing their importance in clinical practice as suggested by Wang et al.

Strengths and Limitations of the Study

The strengths of this study included its comparative evaluation of both rubber dam isolation and cotton roll isolation, considering not just patient comfort

but also those operator-related variables like ease of placement, moisture control, and radiographic interference. It also emphasizes functional clinical factors, such as rubber dams making radiographic positioning more difficult. No prior studying focusing on their detailed comparison exists in the targeted study population. Yet there are a number of limitations that have to be taken into account. The research also depended on subjective patient-reported comfort measures, which, although helpful, might be supplemented with objective measures such as physiological markers of stress in subsequent studies. Additionally, the short-term emphasis on near-term comfort does not address long-term outcomes, such as durability of restoration or postoperative complications, where rubber dams can provide benefits. Preferences of operators, although observed, was not systematically controlled, and thus might have affected procedural efficiency and patient attitudes.

Conclusion

In conclusion, although cotton roll isolation is preferred by patients due to perceived comfort and ease of use, rubber dam isolation is still clinically superior for controlling moisture and preventing infection. The preference between methods must weigh patient comfort against procedural requirements, with a focus on operator flexibility. Future research with larger, multicenter patient groups and extended follow-up may further enhance these results, optimizing isolation protocols in restorative dentistry.

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Conflict of Interest

None to declare

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