

# Rubber dam usage in clinical practice - A Review

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**Abstract: Introduction:** The advantages of rubber dam usage in restorative and endodontic procedures in terms of isolation, patient protection and success of the treatment are well known. In spite of this awareness there exists discrepancy in the usage of rubber dam in clinical practice.

**Aim:** The aim of this review was to evaluate the usage of rubber dam in clinical practice. The present review focuses on the rubber dam usage among dental students, specialists and clinical practitioners and the problems they encountered, and to gather information about their prospective presumptions about using it in the future.

**Conclusion:** Based on the review it was inferred that advantages of rubber dam usage are well understood and appreciated by the undergraduates, graduates, and general practitioners. Though the graduates aim to follow the isolation protocols in future clinical practice, denial of usage is still being reported. Adequate training during graduation and motivation would play greater impact on future use of rubber dam.

**Keywords:** Rubber dam, Isolation, Undergraduates, Clinical practice, General Dental Practice

## Introduction

From the time of introduction of rubber dam by Sanford C Barnum in 1864, there is continuous research on its practicality and methods of [1]. The usage is more inclined for restorative and endodontic procedures. Well known and appreciated uses of rubber dam include control of cross-infection, protection and improving treatment efficiency. Aerosols and droplets formed with the use of air rotor are contaminated with blood and bacteria. Air borne infections are potentially transmitted through the aerosols which can transmit infectious diseases. Moreover, it prevents aspiration of dental materials, solutions, instruments and tooth debris during dental procedures.

There are evidences in the literature which emphasizes the essential role of rubber dam isolation especially for endodontic procedures [2]. Rubber dam usage had always been known to reduce microbial contamination. It prevents ingestion of irrigants, endodontic instruments, restorative materials and protects the soft tissues from irritants. Rubber dam usage is known to improve accessibility, visibility, better moisture control, protection of the surrounding tissues and lesser patient conversation which in turn reduces the operating time. [3–5]

## Current status of rubber dam usage

Surveys undertaken in several countries reported various rates of rubber dam usage when performing endodontic treatment (Table 1). Frequency of rubber dam usage drastically declined following graduation. Usage among undergraduates was over 92.4% whereas only 13.6% among private practitioners and 3.4% of National Health Service practitioners. [6]

In another study, the students were asked to predict their future use of rubber dam for a number of dental procedures. It was reported that most of the students (98%) predicted future use of rubber dam. On the contrary, rubber dam use tends to dramatically decrease following graduation and root canal treatment in general dental practice is usually performed without it. A higher proportion (88%) of the respondents in a dental school reported use of rubber dam [7]. The reason could be attributed to the institutional protocol where procedures must be performed only under rubber dam isolation.

## Reasons for usage of rubber dam

Rubber dam increases the efficiency of the dental practitioner and the quality of restoration is also increased. Rubber dam not only increases the quality of restorations but also boosts the quantity of the restorative services because patients were unable to speak or expectorate when the rubber dam is used. The study further showed that the operating field can only be maintained free of saliva and other contaminants with the dam in place, and the field is more accessible, airborne debris is reduced and patients feel more comfortable.[8] The use of rubber dam during the operative procedure brings about a diminishment in the microbial substance of air turbine vaporizers, consequently lessening the danger of cross-contamination in the dental practice. Rubber dam use reduces the potential for swallowing or inhaling materials or objects used during RCT, as well as pieces of tooth structure, restorative material, or necrotic tissue dislodged during access preparation.[9,10] In addition to patient safety and occupational safety benefits, benefits due to better infection control and treatment effectiveness have been reported[11]

## Reasons for lack of preference of rubber dam

The most-common reasons for avoiding rubber dam use were “inconvenience” and that “it was unnecessary”[12] Time and cost received the least-important ratings. The time saved by operating in a clean field with good visibility and accessibility may compensate for the time spent applying the rubber dam[13] Yet another report states that the most-common reason for non-using certain techniques taught in dental school (such as use of a rubber dam) was “not essential to efficient dentistry”[14]. Patient acceptance has been reported as the main reason in other studies [15,16] although studies that actually suggest that patients have found patient acceptance to be high[17]. Expense is one the reasons for not using rubber dam where the other isolating techniques

were more cheaper and patient friendly. Lack of time, lack of skills and equipment, lack of interest are some of the reasons that can be rectified by creating awareness of its advantages and problems that can be encountered during the procedures.

### Rubber dam usage in various procedures

Patient safety is one of the important reason to use a rubber dam during operative procedures. One study found that using a rubber dam during removal of an amalgam restoration significantly reduced the peak mercury level rise in the patient's plasma.[18] One group of investigators has recommended rubber dam use when restoring Class V lesions in older patients to prevent subcutaneous air emphysema.[19] Although these events are rare in operative dentistry procedures[20]reduction in swallowed or aspirated dental devices is a clear benefit of rubber dam use.

Based on a questionnaire survey it was identified that 53% of dentists reported never using a rubber dam for amalgam restorations, 45% never do so for anterior direct resin composites, and 39% never do so for posterior direct resin composites. 53% reported that they never use a rubber dam when placing posterior composite restorations. Surveys of dental students suggest that while rubber dam usage for operative procedures during dental school is high, these same students do not expect to use a rubber dam commonly for these same procedures once in private practice.[12] Yet another report states that 40%–45% of dentists never use a rubber dam for restorative procedures, depending on the procedure, compared to 11% who never use it for endodontic procedures.[21]

Considering the tooth location and restoration material: 77% of dentists reported never using a rubber dam when placing amalgam restorations in posterior teeth, 59% never use a rubber dam when placing anterior composite restorations, and 52% never use a rubber dam for posterior composite restorations.[22]

Considering endodontic procedures it was observed that less than 19% of the practitioners use rubber dam during root canal treatment, 45% reported that they never use rubber dam [23]. An earlier British survey found that 93% of dentists in the British Dental Association “never or seldom” use a rubber dam for operative dental procedures, compared to 82% “never or seldom” for endodontic procedures[16]. Some population based studies have reported lack of the rubber dam usage during root canal procedures by around 65% of the dentists. [24,25] Only 7% of practitioners used a rubber dam in all RCT cases.[25] However, a national survey of general dentists in New Zealand has reported that the rubber dam was used routinely during RCT by 57% of practitioners[26]. There are reports showing that the usage of rubber dam in endodontics increased the survival rate of the tooth after initial root canal treatment [27]. But considering the placement of clamps, there are possibilities to lose dental structure on repeated placement especially on teeth with white spot lesions in the cervical enamel [28].

There is also convincing evidence of the importance of rubber dam use during resin bonding procedures. A study done by Bragi et al.' showed this. They used cotton wool isolation or rubber dam isolation in bonding resin composite buttons to facial enamel surfaces of teeth that were to be extracted. They found shear bond strengths to be significantly greater when rubber dam isolation was used.[29,30]

Patient preference for rubber dam increased when the purpose and the procedure were well explained. Time taken to place the rubber dam is important. Patient cooperation was well experienced when lesser time is taken for placement and the procedure was completed in a shorter duration of time. Patients preference for future use of rubber dam was appreciated when the procedure was performed by well trained professionals [31].

### Conclusion

Graduates are well trained in rubber dam isolation in the dental schools. However there appears to be lack of motivation in rubber dam application during routine dental treatment in clinical practice. This controversy can be addressed by creating awareness on the benefits and the legal problems that can be easily overcome by simple precaution.

**Table 1: Prevalence of rubber dam use (%)**

Study	Country	Prevalence of rubber dam use (%)
Going & Sawinski (1967)[32]	USA	Always (6.6%), mostly (39.6%), occasionally (16.8%), seldom (13.4%), never (23.5%)
Silversin et al. (1975)[6]	UK	Always (57%), generally (35.4%), frequently (4.3%), sometimes (3.3%) Always (1.5%), generally (1.9%), frequently (1.9%), sometimes (4.3%), rarely (15.1%), never (73.9%) Always (6.8%), generally (6.8%), frequently (6.8%), sometimes (10.7%), rarely (19.4%), never (40.8%)
Swallow (1983)[33]	UK	7.57% used rubber dam 1 month ago 5.12% used rubber dam in the last year 88.84% used the rubber dam more than a year or never used it
Hagge et al. (1984)[34]	USA	81–100% of time (97.7%), 61–80% of time (1%), 41–60% of time (0.4%), 21–40% of time (0.2%), 0–20% of time (0.7%)
Joynt et al. (1989)[21]	USA	Always (62.1%), never (11%)
Marshall & Page (1990)[15]	UK	Most or always (10.9%), occasionally (7.4%), never or seldom (81.7%)
Brookman (1991)[35]	UK	Routinely (31%)
Whitten et al. (1996)[36]	USA	Always (59%) Always (92%)

Barbakow (1996)[37]	Switzerland	Regularly (31%)
Saunders et al. (1999)[38]	Scotland	Routinely (24.9%)
Whitworth et al. (2000)[39]	UK	Always/frequently (20.3%), never (58.1%)
Jenkins et al. (2001)[23]	UK	Routinely (19%), never (44.5%)
Stewardson (2001)[40]	UK	Always (3.07%), more often than not (7.98%), occasionally (25.77%), never (63.18%) Always (28%), More often than not (8%), Occasionally (40%), Never (24%)
Stewardson (2002)[41]	UK	Always (20.6%), more than no (20.4%), occasionally (37.4%), never (21.6%)
Koshy & Chandler (2002)[26]	New Zealand	Routinely (58%)
Slaus&Bottenberg(2002)[42]	Belgium	Always (3.4%), sometimes (18.5%), never (77.3%)
Hommez et al. (2003)[43]	Belgium	Always (7.2%), limited cases (20.5%), never or seldom (64.5%)
Al-Omari (2004)[44]	Jordan	Occasionally (3.8%)
Wilson et al. (2004)[45]	UK	61% did not use rubber dam for endodontics, let alone any other procedure
Bjørndal&Reit (2005)[46]	Denmark	Often (4%), occasionally (14%)
Koch et al. (2009)[47]	Sweden	Always (67%), routinely (20%)
Palmer et al. (2009)[24]	UK	All cases (30.3%), some cases (37.4%)
G S et al (2014) [48]	India	All cases (23%), Root canal (30%)
Zou et al. (2016) [49]	Tianjin	Usage rate - Working experience 5-10 years (76.3%) Working more than 20 years (53.2%)
Madarati (2016) [50]	Saudi	Usage rate - General Practitioners (21.6%) Endodontists (84.8%)

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