doi:10.1111/j.1365-2591.2007.01212.x

Attitudes and use of rubber dam by Irish general dental practitioners

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Abstract

Lynch CD, McConnell RJ. Attitudes and use of rubber dam by Irish general dental practitioners. *International Endodontic Journal*, **40**, 427–432, 2007.

Aim To investigate the attitudes towards and use of rubber dam by Irish general dental practitioners.

Methodology A pre-piloted questionnaire was distributed amongst a group of 600 dentists randomly selected from the Irish Register of Dentists. Replies from dentists working in specialist practice or the hospital dental service were excluded. Dentists were surveyed in relation to their use of rubber dam during a variety of operative and root canal treatments, as well as their attitudes to the use of rubber dam in dental practice.

Results A total of 300 replies were considered from a total of 324 that were received. Seventy-seven per cent of respondents ($n = 231$) worked in general dental practice and 23% ($n = 69$) worked in the Irish Health Board/Community Dental Service. Rubber dam was 'never' used by 77% of respondents ($n = 228$) when placing amalgam restorations in posterior teeth, 52% ($n = 147$) when placing composite restorations in posterior teeth, and 59% ($n = 177$) when placing composite restorations in anterior teeth. Rubber dam was 'never' used by 39% of respondents ($n = 114$) when performing root canal treatment on anterior teeth; 32% ($n = 84$) when performing root canal treatment on premolar teeth; and 26% ($n = 51$) when performing root canal treatment on molar teeth. Fifty-seven per cent ($n = 171$) considered rubber dam 'cumbersome and difficult to apply', and 41% ($n = 123$) considered throat pack 'as good a prevention against inhalation of endodontic instruments as rubber dam'.

Conclusions Whilst rubber dam is used more frequently for root canal treatment than operative treatment, its use is limited. This presents quality issues, as well as medico-legal and safety concerns for both the profession and patients.

Keywords: composites, endodontics, general dental practice, operative techniques, posterior teeth, rubber dam.

Received 22 June 2006; accepted 25 September 2006

Introduction

The rubber dam has long been advocated as a useful adjunct when performing operative and root canal treatment (Ireland 1962). The use of rubber dam is an excellent means of providing infection control during dental treatment by reducing bacterial contamination of prepared cavities or root canal systems, and reducing the transmission of infective agents between dentist and patient (Cochran *et al.* 1989, Forrest & Perez 1989). The rubber dam also facilitates retraction of soft tissues such as the tongue, lips and cheeks during dental treatments.

Previous reports often comment that the use of rubber dam frequently stirs emotions within the dental profession, more so than other dental devices or techniques (Going & Sawinski 1968, Joynt *et al.* 1989, Marshall & Page 1990). It seems paradoxical that a technique that is advocated as promoting and supporting good clinical practice is often ignored in routine dentistry (Ireland 1962). Surveys performed in

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the UK and North America have reported that rubber dam usage is low (Going & Sawinski 1968, Joynt *et al.* 1989, Marshall & Page 1990, McColl *et al.* 1999). It would seem that rubber dam is not routinely used even for root canal treatments (Jenkins *et al.* 2001), where small instruments and potentially harmful agents are being used. Good practice guidelines, such as the European Society of Endodontology (1994), recommend that a rubber dam is always used to isolate the tooth undergoing root canal treatment. From a medico-legal standpoint, dental defence agencies recommend the use of rubber dam when performing root canal treatments, or treatment involving the use of potentially harmful agents such as phosphoric acid (Reid *et al.* 1991). These agencies regard situations where inhalation of an endodontic file occurs, and rubber dam has not been used as indefensible. The use of rubber dam is also advised by textbooks in endodontology (Cohen & Burns 2002, Manogue *et al.* 2005) and operative dentistry (Summit *et al.* 2001).

Some of the usually cited advantages of using rubber dam include:

- to provide an aseptic field isolating the tooth from oral and salivary contamination. This reduces the risk of microbial contamination of prepared cavities or root canal systems (Cochran *et al.* 1989);
- to prevent inhalation or aspiration of instruments or materials used during dental procedures, such as endodontic files, burs, etc. This is not only a medico-legal concern, but also can have deleterious consequences on the patient's health (Cohen & Schwartz 1987);
- to improve infection control procedures and reduce potential aerosol contamination (Forrest & Perez 1989);
- to facilitate of use of materials which may have deleterious effects if inadvertently placed in contact with the gingival or oral tissues (Carrotte 2000, Summit *et al.* 2001, Lynch & McConnell 2003);
- to maintain a 'dry field', which is important when using moisture-sensitive techniques, such as placement of composite restorations in posterior teeth (Reid *et al.* 1991);
- to provide gingival retraction (Reid *et al.* 1991); and
- to facilitate treatment of patients with a pronounced gag reflex.

No information exists on the use of rubber dam by general dental practitioners in Ireland. The aim of this paper is to report on the use of rubber dam during operative and root canal treatment by Irish general dental practitioners.

Materials and methods

A pre-piloted questionnaire was distributed to 600 dentists selected randomly from the Irish Register of Dentists (there are approximately 2500 dentists registered in Ireland). This questionnaire included both 'closed' (those with a choice of answers) and 'open' statements (those which included a space for respondents to write an answer). Information sought included:

- information relating to the year of graduation, practice type and gender of respondents;
- information relating to intra-coronal restorations and endodontic treatments routinely undertaken by respondents; and
- information relating to respondents attitudes to the use of rubber dam.

A stamped addressed envelope was included for return of the questionnaire. All questionnaires were returned anonymously.

Data from completed questionnaires were entered onto an electronic database (Microsoft® Excel 2003). For the purposes of this investigation, descriptive statistics are reported.

Results

Three hundred and twenty-four questionnaires were returned (response rate = 54%). Twenty-four of these were from dentists working in specialist practice or the hospital dental service, which for the purposes of this investigation were excluded. A total of 300 questionnaires were then considered. Sixty per cent of respondents ($n = 180$) were male. Seventy-seven per cent of respondents ($n = 231$) worked in general dental practice; the remainder worked in the Irish Health Board/Community Dental Service. Background information such as the age distribution, year of qualification and school of graduation, are reported in Tables 1–3.

Table 1 Age distribution of respondents

Age (years)	No of responses	Percentage of responses
<30	21	7
30–39	126	42
40–49	66	22
50–59	57	19
60–65	24	8
>65	6	2
Total	300	100

Table 2 Year of qualification of respondents

Year	No of responses	Percentage of responses
Pre-1955	6	2
1955–1964	15	5
1965–1974	57	19
1975–1984	51	17
1985–1994	105	35
1995+	66	22
Total	300	100

Table 3 School of graduation

School	No of responses	Percentage of responses
University College Cork	132	44
Trinity College Dublin	118	39
University College Dublin	24	8
Royal College of Surgeons in Ireland	2	1
UK dental schools	24	8
Total	300	100

Forty-one per cent of respondents ($n = 123$) reported that they did not ask their patients if they have a latex allergy prior to use of rubber dam.

Use of rubber dam for operative dentistry

Ninety-five per cent of respondents ($n = 285$) placed composite restorations in posterior teeth, whilst all respondents placed composite restorations in anterior teeth. Ninety-nine per cent of respondents ($n = 297$) placed amalgam restorations in posterior teeth. Reported use of rubber dam for these treatments is described in Table 4. Seven per cent of respondents ($n = 20$) reported that they placed amalgam restorations in anterior teeth, but none used rubber dam in this situation.

Use of rubber dam for root canal treatments

Not all respondents performed root canal treatments. Some choose to refer cases to dentists with specialist training. In this sample,

- 98% of respondents ($n = 294$) performed root canal treatment on anterior teeth;
- 88% of respondents ($n = 264$) performed root canal treatment on premolar teeth; and
- 66% of respondents ($n = 198$) performed root canal treatment on molar teeth.

Amongst these respondents, the usage of rubber dam for root canal treatments are described in Table 5.

The use of rubber dam for the most commonly performed operative procedure (i.e. placement of an anterior composite restoration), and most commonly performed root canal treatment (i.e. root canal treatment of an anterior tooth), was considered by age and gender of the respondent. These are reported in Tables 6 and 7, respectively.

Attitudes to the use of rubber dam

Respondents were given a series of ten statements to which they were asked to agree/disagree. The statements, and the responses are reported in Table 8. More than half of respondents (61%) felt that rubber dam did not allow posterior restorations to be placed more quickly. Three-quarters of respondents did not feel that rubber dam was necessary when providing isolation for composite restorations.

Discussion

The postal survey/questionnaire is regarded as a common instrument to collect data in the healthcare field due to large amounts of data that it can collect over wide geographical areas in a relatively short space of time. However, a major disadvantage of collecting

Table 4 Reported usage of rubber dam for certain operative techniques

Reported use (percentage in brackets refers to number of cases)	Posterior amalgams, *n* (%)	Posterior composites, *n* (%)	Anterior composites, *n* (%)
Never (0%)	228 (77)	147 (52)	177 (59)
Rarely (1–25%)	39 (13)	51 (18)	42 (14)
Occasionally (26–50%)	12 (4)	33 (12)	48 (16)
Often (51–75%)	9 (3)	9 (3)	6 (2)
Mostly (76–99%)	3 (1)	24 (8)	9 (3)
Always (100%)	6 (2)	21 (7)	18 (6)
Total	297 (100)	285 (100)	300 (100)

Table 5 Reported usage of rubber dam for root canal treatment

Reported use (percentage in brackets refers to number of cases)	Anterior teeth, *n* (%)	Premolar teeth, *n* (%)	Molar teeth, *n* (%)
Never (0%)	114 (39)	84 (32)	51 (26)
Rarely (1–25%)	51 (17)	36 (14)	24 (12)
Occasionally (26–50%)	6 (2)	18 (6)	15 (7)
Often (51–75%)	18 (6)	6 (2)	12 (6)
Mostly (76–99%)	27 (9)	36 (14)	18 (9)
Always (100%)	78 (27)	84 (32)	78 (40)
Total	294 (100)	264 (100)	198 (100)

Table 6 Use of rubber dam for the placement of anterior composites considered by age and gender of respondent ($n = 300$)

	Age		Gender	
Reported use (percentage in brackets refers to number of cases)	<40 years, *n* (%)	40+ years, *n* (%)	Male, *n* (%)	Female, *n* (%)
Never (0%)	76 (52)	101 (65)	133 (74)	44 (37)
Rarely (1–25%)	21 (15)	21 (14)	14 (7)	28 (23)
Occasionally (26–50%)	30 (20)	18 (12)	18 (10)	30 (25)
Often (51–75%)	2 (1)	4 (3)	5 (3)	1 (1)
Mostly (76–99%)	6 (4)	3 (2)	3 (2)	6 (5)
Always (100%)	12 (8)	6 (4)	7 (4)	11 (9)
Total	147 (100)	153 (100)	180 (100)	120 (100)

Table 7 Use of rubber dam for completion of anterior root canal fillings considered by age and gender of respondent ($n = 294$)

	Age		Gender	
Reported use (percentage in brackets refers to number of cases)	<40 years, *n* (%)	>40 years, *n* (%)	Male, *n* (%)	Female, *n* (%)
Never (0%)	41 (29)	73 (48)	87 (56)	27 (19)
Rarely (1–25%)	20 (14)	31 (20)	30 (19)	21 (15)
Occasionally (26–50%)	3 (2)	3 (2)	4 (3)	2 (2)
Often (51–75%)	12 (8)	6 (4)	11 (7)	7 (5)
Mostly (76–99%)	14 (10)	13 (8)	9 (6)	18 (13)
Always (100%)	50 (37)	28 (18)	13 (9)	65 (46)
Total	140 (100)	154 (100)	154 (100)	140 (100)

Table 8 Attitudes of respondents to the use of rubber dam

Statement	Agree, *n* (%)	Disagree, *n* (%)
'Posterior restorations can be placed more quickly when rubber dam is used'	117 (39)	183 (61)
'I have not been taught, or have forgotten, how to use rubber dam'	96 (32)	204 (68)
'Proper isolation for placing composite restorations cannot be achieved without using rubber dam'	78 (26)	222 (74)
'Root canal fillings placed without rubber dam isolation are as successful as when rubber dam isolation is used'	126 (42)	174 (58)
'Rubber dam enables clearer access to the operating site when restoring teeth'	246 (82)	54 (18)
'Rubber dam is cumbersome and difficult to apply'	171 (57)	129 (43)
'A higher clinical standard is achievable when restorations are placed under rubber dam'	96 (32)	204 (68)
'Placing throat pack is as good a prevention against inhalation of endodontic instruments as rubber dam	123 (41)	157 (59)
'Restorations placed under rubber dam have a higher longevity than those placed without rubber dam'	129 (43)	171 (57)
'My patients don't like rubber dam'	171 (57)	129 (43)

data by this means is that a low response rate can occur. This study surveyed a population of 600 dentists (approximately 25% of the dentists registered in Ireland). The response rate of 54% of those sampled is reasonable, but it should be remembered that there may be a form of selection bias in this study; those

practitioners who are enthusiastic about the use of rubber dam may have been more likely to respond than those who are not. The response rate in this study was comparable with that of a survey of Irish general dental practitioners' attitudes to dental nurse training completed recently (Lynch *et al.* 2003).

This study, the first to examine a population of Irish general dental practitioners, has found that in keeping with other similar international studies, the use of rubber dam for operative and root canal treatment is limited (Going & Sawinski 1968, Joynt *et al.* 1989, Marshall & Page 1990, McColl *et al.* 1999). It would seem that despite the advantages of rubber dam, including superior infection control, not to mention medico-legal and safety concerns, the majority of Irish general dental practitioners do not use it routinely. Previous studies have cited a variety of reasons for lack of use of rubber dam amongst the dental profession (Marshall & Page 1990). These include:

- patient discomfort;
- insufficient time;
- difficulty in use;
- insufficient training;
- cost; and
- low fees for treatment.

It has been demonstrated in studies performed over the last few years that patients are generally not adverse to the use of rubber dam during dental treatment, and that many actually prefer to have it placed (Gergely 1989, Stewardson & McHugh 2002). Interestingly, in the present sample, the majority of practitioners reported their patients did not like rubber dam. However, given the limited use of rubber dam by dental professionals, perhaps this opinion may not be valid, possibly being based on the dentist's view rather than on their patients' true opinions.

The argument of insufficient time being a consideration is not entirely valid, as studies in the literature have demonstrated that, when proficient in its use, rubber dam application can be performed in approximately two minutes (Ireland 1962, Reid *et al.* 1991, Stewardson & McHugh 2002). Furthermore, there is evidence that treatments can be performed more quickly once the rubber dam has been applied (Ireland 1962).

The arguments of 'difficulty in use' and 'insufficient training' are linked, and were noted in a sample of UK practitioners by McColl *et al.* (1999). In the present sample, it is interesting that despite many reporting that they had been taught how to place rubber dam, a majority reported rubber dam was 'cumbersome and difficult to apply'. It is worth remembering that a clear majority in this sample reported that they did not routinely use rubber dam, which may be related to a lack of proficiency that ordinarily comes with regular use. Arising from this, there is an indication for a contemporary survey of the teaching of rubber dam techniques within dental schools.

The final arguments of 'cost' and 'low fees for treatment' are traditionally advanced as reasons for infrequent use of rubber dam. This was noted in the study by McColl *et al.* (1999), where the practitioners sampled were working under the regulations of the General Dental Services of the UK National Health Services, who argued that the fee structure for endodontics was inadequate. This argument is invalid in the present sample, as respondents were either general practitioners working on a private basis and charging appropriate fees for treatment, or working as salaried practitioners in the Irish Health Board/community dental service, where cost/fees would not be a factor. Furthermore, a technique that has a clear infection control benefit and medico-legal and safety implications should not be excluded from use for reasons of cost.

Perhaps the answer for the relative lack of use of rubber dam can be associated with another factor, that of attitude? Previous investigations by the author in other areas of contemporary practice, such as prescription of fixed and removable prostheses has found a similar sense of carelessness and lack of attention to legal and 'good practice' guidelines (Lynch & Allen 2003a,b, Lynch & Allen 2005). Could the same argument be advanced in the use of rubber dam? Clearly, many regard the use of a rubber dam during root canal treatment to be a minimum standard of care (European Society of Endodontology 1994), yet within this sample, only 40% of practitioners 'always' used rubber dam during molar root canal treatment The potential medico-legal and safety issues are clear, and it is difficult to understand why so many do not routinely use rubber dam in this situation.

Apart from these arguments there is evidence in the literature that root canal systems that become infected with higher numbers of bacteria are associated with a higher prevalence of post-treatment disease than those that contain fewer and no culturable bacteria (Klevant & Eggink 1983, Sjögren *et al.* 1990). As the rubber dam can reduce the amount of bacteria introduced into the root canal system, it seems logical that its use may have a role in reducing infection. Further investigation of this concept is warranted.

The findings of this study indicate the need to increase the awareness of Irish dental practitioners of the need to use rubber dam for improving the quality of treatment, delivering superior infection control, and meeting medico-legal concerns and patient safety.

Conclusion

Whilst it is reported that rubber dam is used more for root canal treatments than operative treatments in Ireland, its use is by no means extensive. This 'lack of use' presents certain medico-legal, safety and treatment quality concerns for the profession. It may be addressed through increasing the awareness of practitioners of the importance of rubber dam, and by heightening educational awareness at undergraduate and continuing education levels.

Acknowledgement

The assistance of Coltène Whaledent (Ltd) who provided financial support for this study is gratefully appreciated.

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