



**Insights to proximal reduction – A cross-sectional survey
Regarding knowledge and perception among
orthodontists and postgraduates**

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Abstract

Background: Interproximal reduction is an adjunct clinical procedure involving the reduction or anatomic recontouring of the permanent teeth. This method provides an alternative treatment option to gain intra arch space for retraction and for clear aligner treatment.

Aim: The aim of the present study was to assess knowledge and perception among post graduates and Orthodontist in India.

Materials and Method: A web based cross sectional study was conducted from August 2022 to October 2022 using google forms. A questionnaire was framed which consisted of two parts, the first part regarding their demographic details and second part regarding the protocol and guideline followed by the participants. The filled questionnaires were collected and collected data was analysed using descriptive statistics and chi square.

Results: There were total of 502 participants. The gender distribution was 49.4% male and 50.6% were females. 239 Orthodontist and 263 Postgraduate students participated in the survey. More than 50% of orthodontist and postgraduate prefer both manual and mechanical methods for interproximal stripping. The average amount of enamel removal from anterior and posterior contact area was 0.3-0.5mm and 0.5-0.8mm respectively.

Conclusion: The knowledge, attitude and practice among the orthodontist and postgraduate is adequate and they prefer combination of mechanical and manual method for interproximal stripping.

KEYWORDS: Interproximal reduction, clear aligner, Knowledge, Orthodontist

Introduction:

Interproximal reduction (IPR) is a procedure in which the dental enamel in interproximal region between the two teeth are removed.¹ This technique was first introduced by Ballard² in 1944, he advocated the stripping of the mandibular incisors to correct the Bolton's discrepancy. Sheridan³ in 1985 proposed that reduction of interproximal area as an alternative to extraction or expansion procedures in cases of mild to moderate crowding. In 2004 Zaccharison⁴ recommended the interproximal reduction to improve the dental esthetics and to gain intraarch space to resolve crowding.

Interproximal reduction is done either manually with the help of metallic diamond coated strips or with the help of rotary instruments such as diamond burs, tungsten carbide burs or diamond discs on a contra-angled handpiece. Sheridan⁵ in 2007 introduced the Air Rotar Stripping (ARS) technique. Various author recommended the amount of enamel to be removed during IPR. Hudson⁶ in 1965 suggested a removal of enamel of 0.25mm per surface from the incisor and 0.3mm from canine. Peck and Peck⁷ in 1975 reported 50 % of enamel can be

removed in interproximal area .Sheridan⁵ stated about 2.5 mm and 6.4 of space can be achieved from five anterior contact point and eight posterior contact point respectively . After the reduction of the enamel , finishing and polishing is done using fine grit diamond burs or softlex discs or 37% phosphoric acid. According to the ARS guidelines topical fluoride gel application is recommended to amplify the effects of remineralization in the stripped interproximal areas.⁵

With the increasing demand for non extraction treatment such as clear aligners , it is important for an orthodontist and postgraduates to understand and implement interproximal reduction in their practice ,so this study aims to assess the knowledge and perception among postgraduates and orthodontist on interproximal reduction.

Materials And Method

This survey was conducted in the Department Of Orthodontics and Dentofacial Orthopaedics , Sathyabama Dental College and Hospital, Chennai. The ethical clearance was obtained from Sathyabama Institute of Science and Technology, Institutional Bio-safety and Ethical committee, Ref: 198/IRB-IBSEC/SIST Dated 30th September 2021.

A cross sectional study was conducted from August 2022 to November 2022 using google forms with an aim to assess knowledge and perception towards interproximal stripping . A web based questionnaire was framed which consisted 4 demographic question and 19 questions to assess the knowledge and perception of interproximal reduction among postgraduates and Orthodontist .

Inclusion criteria :

- Qualified Orthodontist
- Orthodontic Post graduates

Exclusion criteria :

- Ungergraduates
- General dentist
- Other dental specialist

Sample size Calculaton :

Sample size calculation was calculated from previous study Barcoma et al ⁸

$$n = \frac{4pq}{d^2} = 400 \quad \text{where prevalence (p)=46 , q=1-p, d(allowable error)=5}$$

Questionnaire was forwarded to the participants and the responses were collected. The data was analysed using descriptive statistics and chi square test on SPSS software 25.0.

Results:

The study encompassed a total of 502 participants. In which there were 263 Orthodontic post graduates and 239 Orthodontist. The gender distribution was 50.6% Female and 49.4% male.

Table 1: Depicts the gender distribution in our study.

Gender	Frequency	Percent
Female	254	50.6
Male	248	49.4

Table 1. Gender distribution

The distribution of participants were from different parts of India and the recorded distribution were, the maximum number of participants were from Southern part of India (44.9% Postgraduates and 43.5% Orthodontist) while the least distribution were from Eastern India (1.5% Postgraduates and 2.2% Orthodontist). Among the 502 participants 90% of the participants perform IPR in their practice.

Appraising the knowledge on IPR, many Orthodontist and postgraduate answered that they will not perform any diagnostic procedures like model analysis or radiographic measures before the proximal reduction which was statistically significant ($P < 0.001$). On assessing the knowledge on fluoride application, both orthodontist and postgraduates responded that it is mandatory to perform this step while interproximal reduction, this was statistically significant ($P < 0.05$). Table 2 depicts the Knowledge of postgraduates and orthodontist in Interproximal reduction.

Perception among postgraduates and Orthodontist regarding the method they prefer for IPR was mostly combination method for Orthodontist and manual method for postgraduates in which they used diamond metallic strip for IPR. Most of the postgraduates and Orthodontist answered that the amount of removal of enamel from anterior contact point was 0.5-0.7mm while in posterior contact point it was 0.5-0.8mm respectively. Both the Orthodontist and postgraduate students, use diamond polishing strip (87.6%), followed by diamond polishing bur (61.9%)

for finishing and polishing of the teeth after IPR and the least preferred method was soft lex dics (98.4%) and proximal sealeant (8%). Furthermore, to prevent any future complication such as dentin hypersensitivity and proximal caries both the Orthodontist and Orthodontic postgraduates preferred application of fluoride gel (88.3%), fluoride mouth rinse (78.5%), oral prophylaxis (57.7%). The perception of orthodontist and postgraduates were depicted in Table:3

Discussion:

Interproximal reduction is an adjunct procedure which is employed in Orthodontics to alleviate problems such as crowding, flaring of incisors and arch length toothsize discrepancy. In our study more than 90% of the participants perform IPR on their patients. The gender distribution is more or less equal in distribution 50.6% female and 49.4% male. The majority of the participants from the study is from Southern India (44.9% orthodontist and 43.5% postgraduates) and only (1.55% orthodontist and 2.2% postgraduates) participants were from Eastern India. This geographic variation is due to the primary location of the study is from Southern India.

Regarding the knowledge both Orthodontist and postgraduate said it was much more easier to perform IPR in anterior teeth than posterior teeth. This result is accordance with our study done by Barcoma et al⁸, in his study the orthodontist and general dentist agreed with the statement that it was much more easier to perform IPR in anterior teeth rather than posterior teeth.

In our study both the Orthodontist and postgraduates did not perform any diagnostic measures or separation of teeth before performing IPR. This step is essential in planning the IPR to evaluate how much enamel to be removed before the procedure. Sheridan³ emphasized on the evaluation of enamel surface by the means of dentin mapping and placement of separators or open coil spring before IPR. This is done in order to expose the proximal surface for ease of access.

In the view of polishing and preventive measures to avoid future complications such as dentin hypersensitivity or caries, both the Orthodontist and postgraduates were aware that finishing and polishing the stripped enamel surface is inevitable step and they generally implement in their practice. Zachrisson et al⁹ concluded that IPR does not negatively affect the health of the reduced teeth. Jarjoura et al¹⁰ supported this conclusion and demonstrated that the application of fluoride after IPR provided additional benefit to the patient.

In our study the amount of enamel removed from anterior region is 0.3mm-0.5mm and in posterior region is 0.5mm-0.8mm is agreed with most of the participants. Many authors recommended various amount of tooth removal, it was suggested that up to 0.5 mm per anterior contact area (i.e., 0.25 mm per surface) and up to 1 mm per posterior contact (i.e., 0.5 mm per surface) may be safely removed using IPR.¹¹

In our study the method preferred by most participants is combination method suggested by Sheridan⁵, using burs to break the proximal contact followed by removal of tooth structure by metallic strips. This result was similar to the study by Donovan et al¹², that the removal of enamel surface with the help of handheld strip was 37% and bur was 14%. Final polishing is done with finishing diamond strips and fluoride was the most common preventive method employed by the participants. A study by Harish S et al¹³ stated that the use of softlex disc produced smoother enamel surface than other polishing methods.

Conclusion:

This study aims to assess the knowledge and perception of orthodontist and postgraduates regarding IPR. The conclusion drawn from the results are

- IPR is most commonly used to alleviate Bolton's discrepancy and for clear aligner treatment
- This survey concludes that the knowledge and perception for both Orthodontist and postgraduates were similar except that the postgraduates are more conservative in approach by using manual method of reduction for IPR.
- There is a lack of perception in regards to evaluate the exact amount of removal of enamel before the procedure.
- Both orthodontist and postgraduate know the importance of polishing and application of fluoride to prevent dentin sensitivity and proximal caries.

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S.No	Question	Yes		No		P Value	Chisquare
		Orthodontist (frequency)	Postgraduates (frequency)	Orthodontist (frequency)	Postgraduates (frequency)		
1	Do you prefer performing IPR on the anterior teeth rather than posterior teeth?	193	193	28	37	0.52	16.778
2	Do you perform any diagnostic aids such as model analysis or any radiographic evaluation before performing IPR?	44	71	177	160	0.001*	21.747

3	Do you perform any procedure to separate the teeth to aid in mechanical and visual access?	30	52	191	179	0.11	21.404
4	Do you polish the surfaces of the teeth which have been reduced?	217	217	4	14	0.09	17.024
5	Do you prefer the application of topical fluoride to the teeth that have been reduced?	218	219	3	12	0.05*	16.772

(* P value less than 0.05 indicates statistically significant)

Table 2; Knowledge of postgraduates and orthodontist on IPR

S.No	Question	P Value	Chisquare
1	Which is the most preferred site for IPR in maxillary arch?	0.00*	42.636
2	Which is the most preferred site for IPR in mandibular arch?	0.000*	30.351
3	What teeth shape do you think is not ideal for IPR?	0.003*	29.426
4	Indication for IPR	0.00*	165.185
5	Which method do you prefer for IPR?	0.00*	99.533
6	What mechanical methods do you prefer for IPR?	0.00*	257.407
7	What methods do you prefer to obtain visibility and mechanical access to proximal surfaces?	0.057	35.840

8	What precautionary methods do you prefer to prevent trauma to the soft tissues?	0.00*	57.515
9	How much enamel do you prefer to at contact point in anterior region?	0.115	14.204
10	How much enamel do you prefer to reduce at contact point in posterior region?	0.007*	22.507
11	What finishing and Polishing methods do you prefer for IPR?	0.00*	175.684
12	What precautionary methods do you follow to prevent interproximal caries ?	0.00*	175.684
13	How will you measure the space gained ?	0.007*	44.245

(* P value less than 0.05 indicates statistically significant)

Table 3; Perception of postgraduates and orthodontist on IPR