Case Reports

Lingual Arch as an Integral Auxiliary in Preadjusted Edgewise Appliance

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Introduction

The field of orthodontics has been witnessing a revolution both in availability of three dimensionally controllable appliance systems as well as the introduction of a host of new auxiliaries to enhance the performance of these systems. One of the most important auxiliary to be used in the mandibular arch is lingual arch. It is utilized not only to provide stability and enhancement in anchorage but also aids in choosing different anchorage options by virtue of their design and removable nature (Fig 1).

Case Reports

Case 1

A 13 year old moderately built girl was brought to Dental department by her parents for correction of irregular anterior teeth. There was no pertinent medical or dental history. Extra-oral examination showed symmetrical facial structure with convex profile and competent lips. Intra-oral examination showed severe crowding with all the cuspids blocked out (Fig 2). A normal OPG showed highly placed, rotated but well developed cuspids. Cephalometric analysis brought out dentoalveolar discrepancy with normally related skeletal bases confirming the diagnosis of Angles Class I malocclusion with severe tooth size-arch size disharmony.

The problem list comprised severe crowding, rotations, deep overbite and reduced overjet. Treatment objectives were levelling and alignment of arches, decrowding and correction of midline. Treatment involved therapeutic extractions of all maxillary and mandibular first bicusps. Pre-adjusted edgewise appliance (PEA) therapy was initiated with the need for maximum anchorage. Anchorage in the posterior segment was built up using a combination of permanent mandibular second bicusps and first molars in addition to use of square/rectangular labial archwire. A 54 mm plain 0.032" chrome cobalt lingual arch was then selected, adapted, torqued and inserted into the lingual sheath. Initially, flexible NiTi wires were used for levelling and alignment. 0.010" SS ligature wire lacebacks were used for cuspid alone retraction. Stiff rectangular wires were used in the final stages. Patient was recalled every three weeks for check up of lingual arch for its snug fit and for any

mucosal overgrowth. Once the cuspids were pulled back into the extraction spaces, they were then ligated with the posterior segment. Lingual arch was then used passively till incisor retraction was complete (Fig 3). Thereafter debonding was carried out.

Case 2

A 13 year old well built and healthy female was brought by her parents for consultation for protruding and irregularly placed front teeth. Extra orally, it was well-balanced face having convex profile and competent lips. Intra-oral examination showed Angle's Class I relation with 1 mm overjet and 4 mm overbite with moderate crowding. A normal OPG showed permanent dentition. Cephalometric analysis revealed normal skeletal bases. Model analysis showed arch size-tooth size discrepancy of 11 and 3 mm in upper and lower arches respectively.

The problem list included U/L arch crowdings, end-on molar relationship, class II cuspid relationship, crossbite of both maxillary lateral incisors and increased curve of spee. Treatment objectives were listed as levelling and alignment of arches, decrowding, correction of molar relationship, crossbite and maintaining existing soft tissue profile. Treatment involved therapeutic extractions of maxillary first and mandibular second bicusps (Fig 4). PEA therapy with

Fig 1 : Armamentarium showing specialised pliers, plain preformed lingual arch and lingual sheaths

Fig 2 : Case 1 : Pre-treatment photograph showing mandibular anterior severe crowding

Fig 3 : Case 1 : Post treatment photograph showing improved arch width, round archform and lingual arch in situ

maximum anchorage preservation was started. Initially 0.016" round SS base arch wire with flexible 0.014" NiTi wire was used. Lacebacks were used for maxillary cuspid alone retraction. Classical levelling and alignment of anterior section in the mandibular section were carried out. A 57 mm plain chrome cobalt lingual arch was selected, adapted, torqued and inserted into the lingual sheath. It provided restraint to the lower molars from moving anteriorly. Patient was recalled every three weeks for check up of lingual arch for its snug fit and to prevent any mucosal overgrowth. Once the upper and lower arches were aligned, lingual arch was readjusted and reactivated to aid in lower molar protraction to get proper class I molar relationship (Fig 5). Finishing was done with 0.017"x0.025" SS arch wire.

(Results - Tables 1, 2)

Discussion

Anchorage control in mandibular arch has of late gained acceptance but not without the challenge of availability of limited space unlike in the maxillary arch, where there is a choice amongst a host of readily available

Fig 4 : Case II : Pre-treatment photograph showing mandibular second bicuspid extraction

Fig 5 : Case II : Post treatment photograph showing improved archform protraction of lower molars into extraction spaces and lingual arch in situ

Table 1

Model analysis

Parameter	Pre Rx		Post Rx		Difference	
	I	II	I	II	I	II
IMW	37.52	42.04	38.55	42.11	1.03	0.07
ICW	20.22	30.34	25.20	30.37	4.98	0.03

IMW - Mandibular inter first permanent molar width; ICW - Mandibular inter canine permanent width

auxiliaries. Any appliance design for control of anchorage in the lower arch has to take into account the presence of delicate mucosal environment. One of the auxiliary accepted for use in the lower arch is 'lingual arch'. This preformed plain chrome cobalt, heat treatable 0.032" arch with its simple design [1], ease of horizontal insertion into the lingual sheath and non-interference with tongue movements provides a viable, hygienic and flexible solution to planning of anchorage in lower arch. The results of case reports in Tables 1 & 2 corroborate the anchorage potential of these arches in diverse clinical situations [3] by virtue of absence of any appreciable

Table 2
Cephalometric analysis

Parameter	Pre Rx		Post Rx		Difference	
	I	II	I	II	I	II
P-Q	63	63	64	65	1	2
R-Q	33	34	34	35	1	1
S-Q	28	32	28	34	0	2
LI/MP	87	88	87	90	0	2
U-V	40	45	40	44	0	-1
X-Y	50	49	51	51	1	1

P - Perpendicular from PTM to occlusal plane; Q - Mesio buccal cusp tip of mandibular first permanent molar; R - Perpendicular from mesio buccal cusp tip of mandibular first permanent to mandibular plane; S - Perpendicular from PTM to FH plane; X - Buccal surface of the right mandibular first permanent molar on PA ceph; Y - Buccal surface of the left mandibular first permanent molar on PA ceph

figure differences. The transverse dimension measurements both on the models and in the cephalograms were improved to accommodate round anterior archform.

This auxiliary also brought out many advantages which included continuous action due to 24 hour wearability, possibility of simple adjustments and activations outside the mouth due to ease in its removal and reinsertion to maintain treatment objectives, pleasant wearing due to delicate design, possibility of usage alone or in conjunction with other multiband techniques, possibility of complete or partial heat treatment of the

chrome cobalt based lingual arch when requiring no further change in the dimensions of the arch and eliciting increased patient compliance as it is virtually invisible with no hindrance to oral functions.

On completion of active treatment, both the cases exhibited adequate control of the mandibular molar movement thus reiterating our faith in the use of lingual arch. The transverse dimensions were maintained. The anchorage enhancing role of the auxiliary was adequately supported by the lack of any significant figure differences. The stabilization of the lower molars resulted in preventing rapid closure of extraction spaces [4]. This provided sufficient time to move the cuspids into the extraction spaces thus providing stability to the posterior segment.

References

1. Manual of Orthorama Universal palatal and lingual arch system. Dentaurem Co. Germany, 1994.
2. Dugoni SA, Lee JS, Varela J, Dugoni AA. Early mixed dentition treatment : post retention evaluation of stability and relapse. Angle Orthod. 1995;65::311-20.
3. Rebellato J, Lindauer SJ, Rubenstein LK, Isaacson RJ, Davidovitch M. Lower archperimeter preservation using the lingual arch. Am J Orthod and Dentofac. Orthop 1997;112:449-56.
4. Brennan MM, Gianelly AA. The use of lingual arch in the mixed dentition to resolve incisor crowding. Am J Orthod Dentofacial Orthop 2000;117:81-5.

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Larry's barn burned down, and, Susan, his wife, called the insurance company ...

Susan: We had that barn insured for fifty thousand and I want my money.

Agent: Whoa there just a minute, Susan; it doesn't work quite like that. We will ascertain the value of the old barn and provide you with a new one of comparable worth.

Susan, after a pause: I'd like to cancel the policy on my husband.

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"Doctors at a hospital in Brooklyn, New York have gone on strike. Hospital officials say they will find out what the Doctors' demands are as soon as they can get a pharmacist over there to read the picket signs."

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