A novel patient controlled bidirectional palatal lift appliance
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Background

A number of conditions may result in a soft palate failing to approximate the posterior pharyngeal wall. This is known as Velopharyngeal dysfunction (VPD) and the resulting symptoms include hypernasality and decreased speech intelligibility. PLA may be congenital, developmental, or acquired. Surgery is usually the treatment of choice, however, not all patients are suitable for surgery or previous surgery may have been unsuccessful and so prostheses have a role. Primarily appliances are used for relatively immobile palates of adequate length where surgery is contra-indicated. The aim of a palatal lift appliance (PLA) is to lift the palate posteriorly and superiorly. PLA comprise an anterior base plate with a posterior acrylic lifting plate to approximate the soft palate to the pharyngeal wall. This helps to adequately separate the oral and nasal cavities which can help reduce hypernasality. The difficulty with PLA is in achieving enough posterior extension to be effective whilst still being tolerable for the patient. Patients often need time to adapt, so acrylic is added to the lifting plate incrementally over a number of visits.

Methods

Design of appliance

In Dundee Dental Hospital and School a PLA has been developed which incorporates a screw section to incrementally displace the lifting plate in addition to a flexible spring arm for vertical adjustment. Once the appliance is fitted, patients attend a Velopharyngeal function clinic where videofluoroscopy and/or nasendoscopy are used. These visualise the patient’s soft palate with and without the appliance in place. The lifting plate is adjusted antero-posteriorly using the screw section and vertically using coils to achieve the best possible palatal position as suggested by imaging and a speech sample.

Appliance in-situ

Below are videofluoroscopy images of a patient with hypernasal speech, an immobile soft palate of adequate length and history of a superiorly based pharyngeal flap pharyngoplasty. Further surgery was contraindicated owing to no evidence of functioning levators. The images below were taken at commencement of treatment with a PLA, and on review after 16 months of successful wear.

Figure 1. Novel bi-directional palatal lift appliance

Figure 2. Immobile soft palate on attempted closure. The extent of incompetence can be observed.

Figure 3. Soft palate after PLA initial insertion. The soft palate is slightly elevated towards pharyngeal wall.

Figure 4. Soft palate after PLA adjustment. The soft palate is now more closely approximated to the pharyngeal wall.

Figure 5. Soft palate after further PLA adjustment at home and sixteen months of successful wear. The soft palate is now in close proximity to the pharyngeal wall.

Figure 6. Wirework for screw section, distal coils and lifting plate

Figure 7. Wirework on working model prior to addition of acrylic

Construction of appliance

The guide pins are removed from one side of an expansion screw and rotated 90°. 1mm tubing is then inserted. A length of 0.9mm stainless steel wire is formed into a loop and small coils formed where it meets the distal edge of the baseplate. The ends are then inserted into the tubing. The coils allow for vertical movement of the palatal lifting plate whilst the screw section allows distalisation.

Discussion

The modified PLA allows incremental adjustment distally as well as vertically. Adjustments are quicker and easier than with conventional PLA which usually require addition of acrylic or wirework adjustment over successive appointments. With the modified PLA review appointments are usually shorter and fewer owing to the ease of adjustment and the fact patients can incrementally displace the lifting plate at home on a daily basis. This means that multi-disciplinary clinics can be better utilised for appliance fine-tuning to optimise velopharyngeal function. It also means less laboratory support is required. An additional benefit is that any discomfort caused by over-extension posteriorly can be easily managed by the patient simply turning back the screw. This makes the appliance easier to tolerate and increases compliance.

Conclusions

The modified PLA has the potential to reduce the number and length of review appointments, requires less staff for review appointments and causes less discomfort for the patient.

References