Conservative smile transformation

Jessica Wake describes treating a patient with large interdental gaps and incisal edgewear with a minimally invasive alignment, bleaching and bonding protocol

A lady in her early 30s came to see me because she wanted her teeth to be straightened and the interdental gaps closed. She reported that she did not like her upper central diastema and the anterior spaces (Figure 1).

The patient had previously undergone orthodontic treatment as a teenager but the teeth had not been retained and the gaps had subsequently reopened (Figures 2 and 3).

The three main orthodontic options were:

- Fixed braces
- Clear aligners
- Inman Aligner.

In this case, the fixed brace option was the most suitable. The patient was happy to wear a fixed brace and treatment proceeded, initially with the aim of aligning the teeth, and later to close the gaps.

The challenges centred on whether there would be sufficient room to close the gaps in both arches and align the teeth, while maintaining a positive overjet and giving the patient a good envelope of function.

FIGURE 1: *Initial presentation. The patient did not like her upper central diastema and anterior gaps*

CLINICAL EXAMINATION AND ORTHODONTIC ASSESSMENT

A thorough clinical examination and orthodontic assessment were conducted and photographs taken.

The patient had a class I skeletal pattern, average Frankfort-mandibular plane angle (FMPA) and decreased lower face height with a slightly left-of-centre chin.

Class I occlusion was recorded, a 2-3mm overjet and 30% overbite (Figure 4). The centreline was coincident with the mid face.

The molar relationship was class I on the left and ½ unit class III on the right. The canine relationship was recorded as ¼ unit class II on the left and class I on the right (Figures 5 to 7).

The patient displayed competent lips at rest, and a 90-degree nasolabial angle. Her lip line was average on smiling. There was no displacement on closure.

A compromised envelope of function was causing wear on the incisors with significant attrition of the UL1 (Figures 8 to 10).

There was a crossbite on the UL5 to UL6. Radiographs of the upper and lower anterior teeth looked sound.

The UL1 and LL1 were measured and the Spacewize diagnostic dental crowding calculator was used to determine the arch design and achievable space closure.

The Archwize 3D treatment planning assessment looked favourable, confirming there was 1mm spacing in the upper arch and approximately 1.25mm spacing in the lower arch (Figures 11 and 12).

The case was approved and mentored throughout by the IAS Academy.

TREATMENT PLANNING

The ideal treatment plan would be to

FIGURES 2 and **3:** *The gaps had reopened since previous orthodontic treatment*

FIGURE 4: *The patient had a 2-3mm overjet, 30% overbite and a compromised envelope of function*

DR JESSICA WAKE

After using the Clearsmile fixed brace system for a number of years to treat simple anterior alignment cases, Jessica gained accreditation in fixed braces with the IAS Academy. She has since completed the advanced orthodontic course with Professor Ross Hobson. Jessica was recently awarded Fellowship of the IAS Academy. Her passion lies in minimally invasive cosmetic dentistry and she has a special interest in teeth whitening, composite edge-bonding and anterior alignment orthodontics. Jessica is based at St John's Hill Dental Practice in Shrewsbury.



FIGURES 5, 6 and **7:** *The molar relationship was class I on the left and ½ unit class III on the right. The canine relationship was ¼ unit class II on the left and class I on the right*



FIGURES 8, 9 and **10:** *The compromised envelope of function was causing wear on the incisors with significant attrition of the UL1*


FIGURES 11 and **12:** *There was 1mm spacing in the upper arch and approximately 1.25mm spacing in the lower arch*

The case was approved and mentored throughout by the IAS Academy



FIGURES 13, 14 and **15:** *Treatment commenced with alignment of the upper and lower teeth using the Clearsmile brace system and Clarity brackets fitted in the laboratory-made jigs*

close the gaps and create a class I occlusion, correct the canines and molars to class I, and rectify the crossbite on the UL5 and UL6.

The compromise plan would be to accept the posterior occlusion and crossbites. The class II relationship would remain on the upper left canine.

The upper and lower incisors would be levelled and aligned, and the gaps closed with retraction.

The chosen plan comprised upper and lower alignment with IAS Clearsmile braces and 3M Clarity brackets.

Wires would help with the first stage of alignment, followed by the application of powerchain elastic to help close the gaps.

A short course of home whitening would then take place, followed by restoration of the upper incisal edges.

Long-term retention was planned with bonded palatal and lingual retainers, with Essix retainers worn at night.

The patient consented to proceed with the treatment plan and was advised about the challenges of maintaining a positive overjet and the risk of appearance of black triangles and possible non-coincidental centre lines.

ORTHODONTIC ALIGNMENT

Treatment commenced with alignment of the

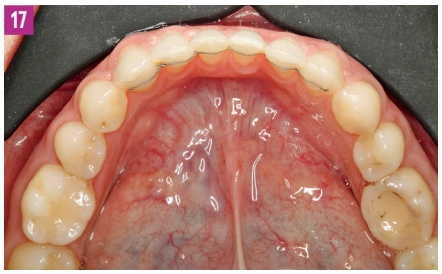

FIGURE 16 and **17:** *At the final orthodontic visit, upper and lower bonded wire retainers were placed to retain the six anterior teeth*

FIGURES 18 and **19:** *Following home whitening treatment, composite edge-bonding was carried out on the upper incisors. The patient was happy with the lower incisors as they were*

upper and lower teeth using the Clearsmile brace system and Clarity brackets fitted in the laboratory-made jigs (Figures 13 to 15). The brackets are very straightforward to apply in this system and easy to bond and debond.

Oral hygiene advice and treatment were provided throughout the orthodontic programme.

As the patient had significant interdental gaps, interproximal reduction was not necessary. Adjustments took place every six weeks.

The nickel titanium wire sequence applied was 0.012, 0.016, and 0.020 x 0.020.

Space closure was then gained in the lower arch using powerchain from six to six over the rectangular 0.019 x 0.025 wire. The spaces in the upper arch resolved by themselves.

Most of the movement took place in the upper and lower six anterior teeth. Progression to 0.019 x 0.025 helped to improve the axial inclination by applying torque.

Composite stops were placed on the distal molar tubes to prevent proclination. These were removed when retraction took place.

FIGURE 20: *Care was taken to create the right length, shape and aesthetics for the desired form and function*

FIGURE 21: *The envelope of function was improved, which will help prevent future edgewear*

FIGURES 22, 23, 24 *and* **25:** *The patient was overjoyed to see the result and surprised at the extent of the aesthetic transformation*

WHITENING AND COMPOSITE EDGE-BONDING

When the desired alignment had been achieved and the gaps had closed, silicone putty and wash impressions were taken of the lingual and palatal aspects of the teeth and sent to the IAS orthodontic laboratory to make upper and lower bonded wire retainers.

Strips of red wax were placed over the brackets to make the impression easy to remove.

At the final orthodontic visit, the bonded retainers were fitted (Figures 16 and 17). They were bonded in place using the flowable composite Kulzer Venus Diamond Flow, which offers reliable strength and works well for fixing wire retainers.

Composite edge-bonding was carried out freehand using the reverse triangle technique

The brackets were removed and the residual adhesive was cleaned off the teeth surface with composite removal burs. Finally, the teeth were polished.

Impressions were taken for custom-made whitening trays and provided to the patient at the next visit for a three-week period of home whitening with Philips Zoom! 16% Nitewhite carbamide peroxide.

The patient's incisors had previously been recorded as A2 shade and the canines and premolars were A3 shade. Following home bleaching, the incisors reached B1 on the Vita shade guide.

At the bonding appointment, each tooth to be treated was etched with 37% phosphoric acid etch gel for 30 seconds, washed and dried. A total etch adhesive was applied and light-cured in accordance with the manufacturer's instructions.

REVERSE TRIANGLE TECHNIQUE

Composite edge-bonding was carried out freehand using the reverse triangle technique on each of the upper incisors. The patient was happy with the lower incisors as they were (Figures 18 and 19).

Pioneered by Dr Tif Qureshi, the reverse triangle technique is a straightforward approach involving placing composite in two separate dentine and enamel layers. The dentine layer forms the palatal shell and comprises the main body of the restoration.

The material to restore the dentine layer needs to be thickest at the margin between the composite and tooth, and thinnest at the incisal edge. An enamel layer is next applied over the surface of the dentine layer, with a small overlap onto the tooth surface. In contrast, the second layer should be thinnest at the margin and thickest at the incisal edge.

The material chosen for the edge-bonding was Kulzer Venus Pearl B1 shade. Venus Pearl delivers consistently superior results, particularly when building up incisal edges where strength is important. It is easy to handle – not too fluid and not too viscous – and does not slump. The composite also polishes to a very high lustre to achieve an outstanding aesthetic effect.

After each tooth had been bonded, a final cure was carried out through glycerine gel to set the oxygen inhibition layer.

Impressions were taken and sent to the IAS lab for fabrication of upper and lower Essix retainers for night-time wear to protect the edge-bonding and help retain the posterior teeth. Finally, the restorations were polished to achieve a high sheen.

SUMMARY

This conservative treatment programme took eight months to complete. Care needed to be taken to create the right length, shape and aesthetics when building up the incisal teeth, for achievement of the desired form and function (Figure 20).

The envelope of function was improved, which will help prevent future edgewear (Figure 21). The patient's oral hygiene had to be worked on throughout the treatment period.

Despite the challenges of the case, the patient was overjoyed to see the result and surprised at the extent of the aesthetic transformation (Figures 22 to 25). CD

CONTACT

jess.wake@mac.com
www.stjohnshilldental.co.uk

PRODUCTS USED

Spacewize, Archwize, Clearsmile braces IAS Academy
Clarity brackets 3M
Venus Diamond Flow, Venus Pearl Kulzer
Zoom! 16% Nitewhite Philips