Introduction to clear aligners

Emma McCrory
Specialist Orthodontist

LISBURN ORTHODONTICS

1

Objectives

- Discuss the history of clear aligners
- Understand the biomechanics of aligners
- Discuss the advantages and disadvantages of clear aligners
- Compare the effectiveness of tooth movements with aligners compared to fixed braces
- Describe the patient flow for aligners
- Understand the process for fitting attachments
- Understand the process for fitting aligners
- Discuss follow-up appointments

LISBURN ORTHODONTICS

2

Introduction

- Clear Aligner Therapy (CAT) is a method of straightening teeth using clear, custom-made plastic aligners. The aligners apply gentle pressure to the teeth to gradually move them into the desired position.
- Virtually invisible, comfortable to wear, and removable for eating and brushing.
- Require patient compliance. Clear aligners need to be worn for at least 22 hours a day to be effective. If aligners are not worn as prescribed, treatment can take longer or may not be successful
- Not suitable for all types of orthodontic cases, eg severe bite issues, large gaps, or severe crowding. These cases may require traditional braces or other forms of treatment.
- CAT is generally more expensive than traditional braces, and it may not be covered by insurance or provided in government hospitals, so it might not be an option for everyone.

LISBURN ORTHODONTICS

3

History of clear aligners

- Align Technology founded in 1997 by Chishti and Wirth (who developed the original idea at Stanford university) with Apostolos Lerios and Brian Freyburger
- Invisalign launched by Align Technology 1999 - initially only available to orthodontists. FDA clearance in 2000.
- A series of clear, custom-made aligners that were worn over the teeth. Worn for 2 weeks, aligners were made from a thermoplastic material on a digital model which had been manipulated to gradually align the teeth over time
- ClearCorrect founded in 2006; now multiple other brands available
- Accessibility of in-house 3D printing means the market is very competitive

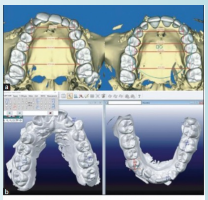


Figure 1: Digital reconstructions of dentures, based on (a) cone-beam computed tomography and (b) intraoral scans[21]

LISBURN ORTHODONTICS

4

Biomechanics

Teeth become misaligned by the misdirected application of forces during tooth development:

1. **Force of eruption**: As the tooth emerges through the gingiva tissue, it exerts a force that pushes the gingiva tissue up and away from the tooth
2. **Force of attachment**: As the tooth becomes fully erupted and begins to function, it exerts a force on the surrounding gingiva tissue that helps to keep the tooth securely in place
3. **Force of occlusion**: The force exerted by opposing teeth during biting and chewing, which helps to maintain the proper alignment of the teeth.

These forces are regulated by the surrounding bone and ligament structure, which are important for tooth stability and proper functioning.

LISBURN ORTHODONTICS

5

Biomechanics

Clear aligners are specifically shaped to guide teeth into desired positions:

- flexible materials such as polyurethane or ethylene vinyl acetate
- adjusted to apply the necessary forces for tooth movement.
- Shape-moulding effect achieved by making small incremental movements that cause the aligner to deflect and stretch over the teeth when inserted.
- Once aligner is seated, the force features apply pressure to move the teeth into the desired position.
- Attachment devices eg power ridges or buttons, allow for the exertion of a desired force and are often used to enhance or assist in specific tooth movements and for retention of the aligner.
- digital assessment tools are used to closely monitor the accuracy of the application of forces.

Figure 2: Tooth movements using attachments to transmit forces. The center of resistance is blue, while the line of action is red[22].

LISBURN ORTHODONTICS

6

Advantages of clear aligners

Patient	Clinician	Practice
• Invisible • Comfortable • Removable • Eat, brush, floss as normal • Improved hygiene during treatment • Can visualise treatment goals • Reduced visits	• 3D treatment planning • Improved tooth positions prior to placement of restorations • Control of tooth positions and movements • Improved hygiene during treatment • Reduced risk of decalcification • Minimal additional instrumentation required • Minimal/no emergency appointments	• Provides an aesthetic options • Increases self-referrals • Demonstrates practice is committed to advancing with technology • Captures other pools of patients who would otherwise not consider orthodontic treatment • Reduced chair time • Increased revenue

LISBURN ORTHODONTICS

7

Disadvantages of clear aligners

Patient	Clinician	Practice
• Invisible? • Speech difficulties initially • Requires lifestyle change • Commitment	• Treatment plan cannot be changed easily – lots of wastage if new aligners required • Less control – more pt compliance required therefore results dependent on pt – affects reputation	• Costs

LISBURN ORTHODONTICS

8

Effectiveness

Aligners are good for:	Aligners are less good at:
• Mild-moderate crowding (non-extraction) • Anterior open bites (intrusion – wedge-effect) • Proclination • Tipping movements ("expansion") • Intrusion	• Rotations • Extrusion • Extraction space closure • Overbite correction

LISBURN ORTHODONTICS

9

Patient Flow

1. Initial Consultation - Specialist
2. Records – Photos/OPT/Digital scan - Therapist/Nurse
3. Treatment plan review/digital plan analysis – Specialist:
   - confirm number of aligners
   - position of attachments
   - IPR
   - frequency of changes
   - number of visits to practice
4. Fit attachments and first aligners – specialist/therapist
5. Review appointments - Therapist/Specialist

LISBURN ORTHODONTICS

10

Attachment fitting

1. Attachment template – confirm stage
2. Isolate – moisture control
3. Etch and bond
4. Flowable composite into attachment spaces on template – overfill
5. One arch at a time
6. Lightcure
7. Remove template
8. Flick out any excess composite interdentally/occlusally
9. Check contact points with floss
10. Put attachments on ***before*** IPR – gingival bleeding!

Advise patient:
- Aligner will be more difficult to remove
- to contact practice prior to next routine appointment if any attachments come off
- Warn about staining if heavy coffee drinker
- Use of Chewies/cotton wool roll essential

LISBURN ORTHODONTICS

11

Fitting aligners

1. Check aligners seating fully on all teeth (trim 8s?)
2. Show patient how to use chewies/cotton wool rolls
3. Practice insertion and removal

•Advise:
- 22 hours wear per day
- Change every 7-10 days (date aligners – only give them how many they need until next appointment)
- Take out for eating and cleaning
- Can keep in for drinking water only
- Clean teeth thoroughly after every meal/drink before replacing aligners
- Flossing helps clear contact points
- Use of 'Chewies' esp at bed time

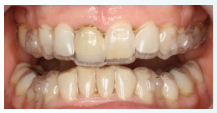
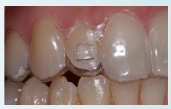
LISBURN ORTHODONTICS

12

Reviewing aligners

Checklist

1. Compliance – have they been wearing them for the time as prescribed, are they wearing the correct number of aligner you would expect for this stage of treatment, weight loss?
2. Attachments – use software/attachment template from initial fit to check all attachments still intact
3. Check aligner fit - any tracking issues?
4. Compare with digital plan – on track?

LISBURN ORTHODONTICS

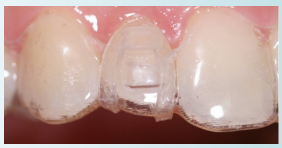
13

Loss of Tracking

Why does this occur?

- Poor compliance
- Ambitious tooth movement

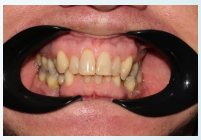
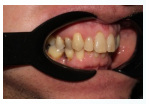
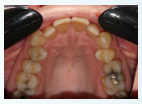
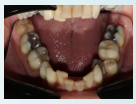
- Check compliance
- Check contacts (floss)
- IPR if needed
- Chewies, esp at bedtime
- Step back into previous aligner/retrack/additional aligners/elastics
- Wear aligners longer



LISBURN ORTHODONTICS

14

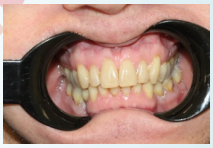
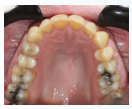
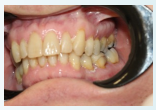
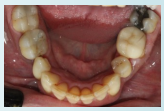
'Complex' Aligner Cases


LISBURN ORTHODONTICS

15

'Complex' Aligner Cases

LISBURN ORTHODONTICS

16

Conclusions

- Aligners are a great aesthetic option for patients in suitable cases
- Careful planning and case selection is required
- There are lots of aligner brands and choice – dictated by practice/specialist
- Aligners are not as effective as fixed braces for certain tooth movements
- Introducing aligners into the practice requires a different workflow from fixed braces – teamwork

LISBURN ORTHODONTICS

17

References

LISBURN ORTHODONTICS

18


LISBURN
ORTHODONTICS
Thank You.
Any questions?
Contact: emma@lisburnorthodontics.co.uk

19