Clear aligners: How has the technology evolved?

Traditionally, malalignment has been corrected using fixed orthodontic appliances. However, in 1999, Align Technology made its Invisalign system available for commercial purchase, altering the future path of orthodontics. A clear aligner, Invisalign offered an effective alternative in orthodontic treatment, as its correct use can minimise the plaque build-up, gingival recession and inflammation of soft tissue sometimes associated with fixed appliances. Additionally, its complete lack of metal parts presented an aesthetic advantage, and the ability to remove it at any time (especially relevant during eating) allowed Invisalign patients a level of comfort and hygiene care previously unmatched in orthodontic treatment.

Through its recently introduced Invisalign Go system—a treatment programme aimed at guiding general dental practitioners through the process of identifying, planning and treating suitable cases using the aesthetic tooth straightening solution—Align Technology has become entrenched as the global market leader in clear aligners. Other companies have since recognised the value of this therapy, through, and this increased focus has led to a rapid progression in the sophistication of aligner modelling and manufacturing.

Dr Les Joffe, Secretary of the European Aligner Society (EAS), the only international organisation in Europe devoted to the promotion of education and research in aligner therapy, believes that these advancements have not yet been fully recognised by all dental practitioners. In an interview with Dental Tribune, Joffe said that dental professionals often pass judgment on the suitability of aligners based on outdated information and technology. “There is a misunderstanding by many clinicians that aligner treatments are limited,” said Joffe. “Many clinicians base their view on the early stages of aligner development, from around 2001 to 2003. More than 15 years later, the huge strides that have been made in aligner performance are not fully understood and therefore the modality is either not adopted or provided.”

These major advancements in clear aligner technology include the integration of much more sophisticated 3D modelling software, able to customise each aligner to an individual patient’s needs. “Clear aligners have deeply changed orthodontics,” Agnieszka Dziedziul, Clear Aligners Department Manager for NimroDENTAL Orthodontic Solutions, told Dental Tribune Online. Established in 1991, NimroDENTAL is one of the largest orthodontic laboratories in the UK, using four different alignment systems in its work with dental practices. “When we started making clear aligners 15 years ago, we were limited to creating movements by hand on a plaster model,” said Dziedziul. “Today, though, we use sophisticated software and the latest 3D printers to create clear aligners that can correct the majority of malocclusions.”

The lack of awareness of clear aligners’ benefits among dental practitioners has sometimes been attributed to a lack of scientific studies...
on this treatment modality. As aligner therapy has developed and become more widely adopted, however, increasing research into its effectiveness and patient satisfaction rates has been conducted. For example, a 2015 study published in the BMC Oral Health journal compared oral health status and satisfaction levels among patients who had received fixed appliances and those treated with the Invisalign system. It found that Invisalign patients were more satisfied overall and enjoyed greater periodontal health, with slightly lower levels of dental plaque. According to another study, conducted in 2013 and published in The Angle Orthodontist journal, compared with those treated with conventional edge-wise brackets, patients who had received aligner therapy had significantly fewer dental visits, shorter treatment duration, fewer emergency visits and less overall chair time.

Aligner therapy is one of the fastest-growing areas in orthodontics, driven significantly by patients who regard it as a more comfortable, convenient and discreet alternative to fixed appliances. Given that market research firm Technavio has projected this market to grow at a compound annual rate of 12.68 per cent globally from 2016 to 2020, the need for organisational bodies to increase education and awareness of aligner therapy is essential. The German Association for Aligner Orthodontics was founded in 2007 and the Japan Academy of Aligner Orthodontics in 2012, with both organisations aiming to foster a space for increasing awareness of the applications and advantages of aligner therapy.

More recently, the EAS was established in 2013, with Dr Graham Gardner serving as its founding and current president. In order to promote education on the latest technologies used by clear aligners, the EAS will be hosting its first AlignerLab workshop on 18 February 2017 in Vienna in Austria. It follows on from the successful first EAS congress in February 2016 and will provide clinicians with an opportunity to engage in a variety of hands-on sessions covering 3-D intra-oral scanning, 3-D printing, virtual treatment planning techniques and tooth movement acceleration techniques.

Gardner believes the AlignerLab will highlight how far aligner therapy has come in such a short time. “With the explosion in the 3-D treatment planning and manufacturing processes new available, we at the EAS believe that not only do we need to update our knowledge on the various aligner systems available, we also need to understand the associated hardware—scanners, computers, software, 3-D printing—that is necessary to optimise the aligner system and improve treatment results,” he told Dental Tribune. Gardner envisions the event ideally becoming a regular occurrence to allow dental professionals to trial and compare new systems and developments in aligner technology.

(Article by Brendan Day, DTI)