Aligner orthodontics: The market is huge!

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As readers of the Journal of Aligner Orthodontics, you surely already know that clear aligners are one of today's most sought-after orthodontic treatment options. Business insiders predict that the overall aligner market worldwide will grow by 22% during the forecasted period of 2024 to 2029.[1]

When aligner orthodontics first emerged more than 25 years ago, orthodontists worked mainly with external contractors to provide clear aligner treatments. Since then, advancements in 3D printing technology have improved the production of clear aligners significantly, and today's 3D printing solutions are widely available to both dental laboratories and private practices, which allows orthodontists to choose between outsourcing aligner production to a laboratory or producing in-office or even direct printed aligners. The market has become so vast that it is almost impossible to keep abreast of the situation. I would like to try to point out some of the considerations the treating doctor has to keep in mind and aspects they can choose between.

When we first started delivering aligner treatment over two decades ago, there were very few outsourced aligner systems on the market, so the choice was restricted based on where you lived and what system was available. Now, however, the aligner market has exploded, and there are numerous systems available, almost too many to list.

Outsourced aligner systems differ in various ways. This might be in terms of pricing, the possibility to submit patient information through the online portal, or the ability to upload data obtained using different intraoral scanners. Some systems offer the chance to create the data required to produce the aligner in the practitioner's laboratory, whereas others only allow production of aligners without virtual treatment planning. The systems vary tremendously in terms of the time from submission to the first treatment proposal, or in the time it takes for changes to be made in the virtual setup. Delivery time after approval of the treatment procedure also varies, as well as the country of manufacture and the quality of the digital setup.

The virtual setup itself is dependent on the simulation software, which varies in terms of quality and tools. It may include virtual simulations of the smile or integrate CBCT and therefore tooth roots into the planning process, to name only a few possibilities.

Different companies proceed in different ways when manufacturing aligners; they may all be fabricated simultaneously or sent in phases, or new intraoral scans may be required frequently. There are also different options available for online monitoring.

Some aligner systems might not allow placement of attachments, whereas others offer special kinds of attachments designed using artificial intelligence for every single tooth shape, or allow placement of attachments of various shapes modified in the software by the doctor themselves. Templates for attachment bonding differ with each aligner system, for example in terms of elasticity. Pressure points and other tools offer improved force application for tooth

or root movements, and features such as bite ramps in different shapes and positions help to treat deep bites and resolve crossbite situations.

The aligner material varies with regard to thickness, modulus of elasticity or margin design, such as scalloped or straight, in different heights.

Some companies have launched special products for children and teenagers that allow improved anchorage on primary teeth, offer features for tongue control in open bite situations, or influence growth with special wings or blocks integrated into the aligners. Button cutouts and integrated cuts or buttons enable the use of elastics in younger and older patients alike. Performing maxillary transverse expansion with aligners fabricated specifically for this purpose is also an option. Young patients might request more colourful aligner options, so stickers can be chosen, and so-called compliance indicators can help to motivate them to wear their aligners.

Outsourced aligner systems vary in terms of the pricing of different treatment types, which may be dependent on the number of aligners or additional phases, optional retention aligners and the overall time frame within which the doctor is able to order additional aligners. The approach to re-ordering aligners in the event of loss or poor fit or for further retention is also handled differently. Some industrial aligner systems require practitioners to take a certification course or undergo further training in order to use them. Some systems have specialised within the orthodontic market to act as a provider for general dental practitioners, whereas others go directly to the consumer. Certainly, all of them have a financial interest in becoming a major leader in the market.

In-office aligner treatment, on the other hand, is a process of conventional analogue aligner fabrication that is well known to almost every dental practitioner and that previously began with impression taking, before separating and moving the teeth on the plaster setup casts and finally thermoforming the aligners on these casts. The general steps involved in digital in-office aligner fabrication are not too different, and give the practitioner nearly full control of the whole manufacturing process. Further solutions with different software systems are emerging constantly with the aim of simplifying the process and increasing the feasibility of fabrication. Despite the simplicity of the software and the ease of use of the presented solutions, sufficient understanding of the biomechanics of aligner therapy is crucial for treatment success. The need for aligners to be transported over long distances and for the use of significant amounts of plastic packaging can be avoided with the in-office aligner procedure.

The latest developments have put direct printed aligners on the market as a new treatment option that offers further advantages for practitioners and patients as well as for in-house laboratory production. Depending on the complexity of the case and equipment, direct aligner printing can enable faster production for smaller numbers of aligners for patients with less complex treatment requirements, allowing increased flexibility of production. As aligners can be designed in many different ways, their thickness, length and shape, as well as their distance from the tooth surface, can be determined directly in the software and in the aligners themselves. Overall, the practitioner is completely independent in terms of how they perform aligner treatment and can deliver in-office aligners to their patients rapidly.

Owing to the different benefits offered by all the described workflows, orthodontists can present a full range of aligner treatments to their patients and capitalise on the advantages of each system. Due to this wide range of options, it is sometimes not easy to establish which system and which procedure best suits the individual treatment approach of each practitioner.

The JAO will continue to try to shed light on this maze of different aligner options in all their different aspects. It is your support and contributions that make this possible, so let's look forward to what the future in aligner orthodontics holds!

References

1. Global Clear Aligner Market: Analysis By Treatment Cases, By Procedure, By Age Group, By End-User, By Material Type, By Region Size and Trends with Impact of COVID-19 and Forecast up to 2029. https://www.researchandmarkets.com/reports/5448152/global-clear-aligner-market-analysis. Accessed 23 April 2024.