Interview with Dr Sean K. Carlson: Three-dimensional “technologies are going to become the standard of care”

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Dr Sean K. Carlson is Associate Professor of Orthodontics at the University of the Pacific’s Arthur A. Dugoni School of Dentistry in San Francisco and maintains a private practice in Mill Valley, both in California in the US. Carlson is also a senior investigator in the Craniofacial Research Instrumentation Laboratory at the dental school. He lectures nationally on a variety of clinical and theoretical subjects, with a focus on 3-D imaging in orthodontics. His primary focus is on using computer technology to improve the way we study, teach and practise orthodontics. During the Spring Meeting of the European Aligner Society, which took place in Venice in Italy from 29 to 31 March, Carlson shared some of his thoughts on making the change to 3-D technology in orthodontics, the use of clear aligners and treating sleep apnoea.

Why did you choose to specialise in orthodontics? Did your need for creativity have anything to do with your choice?

Of course! Orthodontics is incredibly creative, and I think, depending on the type of orthodontist you become, you can express that creativity in ways that are difficult in other careers. I’ve always liked the idea of healthcare; I am very altruistic in nature and like to help people, so all fitted very well in choosing orthodontics. It is a very clean profession in healthcare: your patients are not truly sick, but you are helping them with your engineering skills and spatial relationships, which always interested me, so it all came perfectly into place with my personality traits and I’ve never found anything more interesting.
What do you mean when you say that depending on the type of orthodontics you practise you can express your creativity better? I think there are both creative and non-creative orthodontists. Some people follow the rules, follow what was done before and never think for themselves and, in doing so, just repeat what’s been done. That’s fine but is not going to push the specialty forward. If you are going to be creative, your job is to find the next level, find the horizon, and not everybody wants to do that because it is challenging.

You spoke about altruism being important to you. How can we apply it in orthodontics? Giving back is essential and I think you should do it at every opportunity you can, but I think value in delivering service is important. Doctors tend to think that caring is about providing free treatment. That’s not fair. Human relationships are about exchange. If you are expected to give with nothing in return, people won’t value what they are receiving. I have no problem with the cost of something; if it has value to you, I think the cost is worth it. That does not mean you should ignore people that are less fortunate, so I love programmes that help patients who can’t afford the treatments.

Dr Melissa Shotell in her presentation stated that only 20 per cent of dentists use CAD/CAM technology and Dr Adriano Marotta Araujo that only 10 to 20 per cent use aligners. Three-dimensional technology is at the core of your treatments, possibly your teaching and research too. Why do you think so many dentists do not use these amazing technologies, and how could we change that? There are two major reasons people don’t use them: cost and experience or the lack thereof. They either don’t want to pay for it, which brings us back to our discussion about service with orthodontics. Even if the technology is great, such as a 3-D CAD/CAM camera or a CBCT device, if you think it is overpriced, you will find any excuse not to use it. So, the challenge with these new types of technologies is that people don’t understand the value until they have paid the cost to own them. Once you get into new technologies and you realise you can’t live without them, then the price does not matter, but getting people to that point is very hard.

The other reason is the learning curve of these new technologies. Whether it’s using CAD/CAM to produce crowns using 3-D milling machines or using impression-free imaging or CBCT, learning how to use them is difficult; you need practice and it’s hard work. Many dentists and orthodontists are very comfortable; we have a very good life, so why make it hard? I think we just use the excuse to avoid pushing through the pain, and it stifles our progress. But there are always going to be doctors who understand that pushing through that pain ceiling to become better is a constant pursuit in daily practice. And if you do that, you adopt these new technologies very quickly and end up being on the leading edge of technology.

These technologies are going to become the standard of care; there is no question about it. It is just going to take a generation or two to happen.

Since you teach as well, you’d be able to say whether I’m correct in surmising that the next generation does not plan to have a practice without 3-D technologies, right? There is no question that my students understand these types of technologies ten times better than a seasoned orthodontist who is 50 years old and has a really hard time adapting to new technologies because he or she, like the rest of us, is really comfortable and doesn’t want to feel pain. The young doctors understand this and are very eager. The challenge for them is cost because they are fearful of not being able to afford things. I think that the young students who understand that this technology is necessary will thrive, but the students who are focused on the cost issue will end up stalling their practice growth and be five years behind the ones who use it. So, a lot is about fear. The main answer to your question is that people are scared and that is just human nature; we don’t like change, whether it is where you live, or in your relationships or career. Anything that’s unknown is scary and hard. By nature, human beings don’t like pain, so that’s what’s keeping people behind.

There are nowadays many companies on the market, and competition will drive the price down, don’t you think? Yes, that is one answer but not the real answer. Bringing costs down is not the way to solve fear. An example is CBCT. When I got into it, almost 12 years ago, it was very expensive and there was no education available—it was like diving off a cliff. My first CBCT machine cost over US$200,000 and that was a lot of money! You can now get a machine for much less; so yes, the cost will always come down as technology advances, but seeing something that offers so many new possibilities, that insight, as happened for me when I first saw what CBCT could do, meant I could not go back; I had to have it. The value overcame the cost; I could not practise consciously and not have that because I knew it was out there and how it could improve the treatments and care I was giving my patients.

Aligners are not suitable for everyone. Can you tell me when you do not see them as a treatment possibility, and if you use them as part of a hybrid treatment plan? My practice treats children exclusively—a conscious decision I took four years ago when I decided to commit to what I was really good at and really loved, which is...
building faces and young bites that are healthy and will last a lifetime.

I do a lot of developmental treatments, a lot of two-phase treatments. Therefore, I have very small interventions, often in children aged 7 to 10, in which we develop facial bones, correct jaw width and allow the dentition to erupt quite straight. Cleaning that up with conventional fixed appliances to get a perfect occlusion is what we do in our second phase, which usually happens around 12 years old. Conceptually, you can do that with any appliances, so it does not matter if one uses lingual or labial appliances or aligners; it is just about knowing what your goal is and how to get there, and making sure to evaluate your results to get to a result that is good and stable. Therefore, as long as you are paying attention, you can use anything. Personally, I do not use aligner therapy a lot simply because what works well in my practice is conventional labial appliances, which are on for very short periods. For my practice model, it is very efficient and the only reason I do it that way, I think someone can have a practice exactly like mine and do it with aligners completely; it is just not what I developed. If I wanted to switch my practice to aligners, thought that it is that much better than what I am doing, I would push through the pain we talked about before and do it. But I don’t yet see someone getting results that are remarkably disruptive to what I am doing, results that I cannot achieve with the way I work.

Okay, but do you use them in particular cases or in combination with conventional fixed appliances? Do you see that one day they will replace conventional appliances?

Much depends on the area where you live and the demand for it. In my area, a very wealthy community with a lot of discretionary income and high education, and because I treat children, the demand for aligners is not as high. Will conventional fixed appliances ever go away completely? Maybe, but I think that because there are still certain challenges with aligners conventional brackets are slightly better at certain things. I just don’t think it is going to be an all or nothing game; it just depends on the type of practice you have.

In your presentation, you spoke about a 91 per cent decrease in the apnoea–hypopnoea index with maxillary expansion and removal of adenoids and tonsils. Is it a possible solution to snoring for both children and adults?

If you identify and can remove those tissues, it is beneficial. I think that, at least in the US, adenoids and tonsils are largely overlooked now compared with the 1970s. I believe in the late 1970s or early 1980s, a study had come out stating that recurrent infection was not a reason to remove adenoids and tonsils, so doctors decided not to do it anymore and insurance didn’t cover it so readily. What they did not know at the time was that all these breathing issues were also related to obstruction in the adenoid and tonsil areas. They probably overlooked the fact that many of these children were suffering from sleep-disordered breathing because of their tonsils and adenoids. If you can identify this problem, it is a life changer for these children, and I think that, if you don’t look at that, you could be missing a massive health benefit for your patients, and I therefore believe all of us should consider this.

Does expansion or adenoid and tonsil removal cure sleep apnoea?

No, it is a very complex disease. We do a lot of early expansion in my practice, called rapid palatal expansion, which is sutural distraction of the maxilla, to improve the width of the maxillary bones, and this is now also done more commonly on adults, using temporary anchorage devices to produce larger maxillae. There are many studies in the literature that show an increase in upper airway volume with maxillary expansion, so physically, you create a larger airway space. That does not necessarily correlate with curing sleep apnoea. For some patients with a structural issue, it improves their sleeping quality tremendously and sometimes you can eliminate intra-oral appliances.

If you can benefit many patients and understand that you won’t cure or benefit all patients, then I think it is an important thing to do. I think what is happening, at least in the US, is that people are trying to make it an all or nothing argument. They either want to know that it definitely works and cures everybody, or it definitely does not work. The problem is that, it is never that easy. Biology, healthcare and medicine are never that easy. Getting a study to tell you one way or another is not how research works; you are never going to get the answer from one study, but people want black and white.

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