

As a society and specifically as a dental community, we sit a lot. Whether in our car, at a computer, on the sofa, or on a dental stool, our spine is sadly at increased risk of injury due to the excessive amount of sitting we endure most of our day. Numerous epidemiological studies have shown that clinicians, as well as professional office workers, who are in a seated position, have an increased chance of suffering from back trouble. The reference list is endless – but you know firsthand, your own back pain is evidence enough. The bottom line is this: sitting can be helpful instead of hurtful.

Firstly, to better appreciate why sitting can be so damaging, it is helpful to understand the curvature of the spine and even some history regarding the evolution of chairs. The spine has three natural curves: the cervical, thoracic and lumbar. Every body has different spinal configurations and degrees of curvature. For example, female gymnasts commonly exemplify a large degree of lumbar curvature, termed lordosis, and conversely, a retired senior dentist who hunched over his patients for numerous years, might show a severe thoracic curvature called a kyphosis.

The spine has a natural gentle lumbar slope at the base of the spine; however, when we sit, this natural curve is lost and the amount of pressure on each intervertebral disc is doubled when compared to the normal lumbar curve when it is not violated.¹ Preventing this loss of curvature is incumbent when sitting on a chair or dental stool; however, most dental stool manufacturers have left out this vitally important aspect of stool mechanics. It has only been very recently that a “lumbar support” has been added to dental stools, but this simple addition is not enough.

Problems arise when the pelvis, which intricately attaches to the lower part of the spine at the sacrum, is asked to perform a function it was not designed to do. It is analogous to the patient who uses anterior teeth to gnash food when some of the posterior teeth are missing. Over time, inevitable damage occurs.

Chair Changes and Stool Alterations

The earliest chairs were an article of state and dignity as well as an emblem of authority (e.g., a king or queen’s throne).² These chairs were often made of hard wood, ebony



Sitting Doesn't Have to be a Pain in the Butt

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or ivory. In Europe, thanks to the Renaissance period, chairs ceased to be a privilege and became a standard item of furniture, but only for those who could afford them. Ergonomics was certainly not part of chair design.

Around the early part of the industrial revolution the divide between upper and lower class became more distinct. The poor working class stood all day. Up until this time, dental clinicians also stood; however, some dentists wanted to sit in order to elevate their status and earn greater respect in their profession.

In the mid-early-1800s Sir John Tomes of Britain was the first dentist to have a stool in his operatory and perhaps the first person to sit down and perform dentistry. The chair was “overstuffed,” and by 1870 dental stools were commercially available to dentists. Despite the growing market for stools, by the end of the century, dentists still did not feel justified in sitting down.³

In 1909, William Reynolds patented the first dental stool.⁴ It was not until 1958 that John Naughton, founder of the Comfra Lounge Chair Company, had a meeting with two dentists at a convention to create a dental chair. Even at this time, a dental stool for the clinician was not part of the overall design along with the patient chair. But after observing the clinicians at work, Naughton was convinced that the dentist needed to work from a seated position to preserve energy.⁵

In the medical arena, stools were originally used in the mid-1960s when doctors wanted to sit down to evaluate their patients. These stools employed a round seat pan and a sort of “one-size-fits-all” phenomenon for quick examinations. Trying to borrow from the medical profession, doctor stools were simply ineffective for dentists who needed to sit for longer periods of time.

Dental Stools

Today, practicing dentistry or dental hygiene requires the clinician to often sit in a prolonged position. Even while seated the practitioner works between two positions: active and passive. Up until recently, most stool manufacturers only crafted stools to work in the passive position. That is, there was no mechanism that allowed the chair to tilt forward.

When there is no forward tilt mechanism the clinician is forced to work from the body instead of the support of the chair. Working in this compromised position, the upper- and mid-back rounds and becomes kyphotic to get closer to the patient. In addition, significant pressure is forced onto the hamstring leg muscles, which bear the brunt of the lean, causing restriction of



Fig. 1

Fig. 1: Due to an unsupported back, the operator perches forward and cranes her neck in order to get closer to the patient.



Fig. 2

Fig. 2: A combined back support and tilted seat pan allows for a healthy lumbar curve and anteversion of the pelvis. Note the hip opening to approximately 130 degrees.

blood to the lower extremities. Lastly, the lower back, which must compensate for the head being held down and forward, is jeopardized. Imagine a bowling ball hanging from your neck while leaning over a patient and you can understand that your tail must overcompensate and round under to counterbalance the weight of the head, which can be more than 10 pounds. More significantly, the head weight is doubled for every inch it progresses forward. It is simple physics: what happens at one end affects the opposite end.

Up until about 2004, most stool manufacturers used male dimensions to create a stool, and it was often made to “match” the décor of the patient dental chair, with little attention to operator ergonomics. Currently, with the number of female dentists increasing every year, the advent of a more personalized and customized chair, designed for women in particular, seems paramount.

Unfortunately, most seat pans in the industry are too deep for the average woman.⁵ When a woman sits on a stool with a seat pan that is too large, she often has to perch on the edge of the chair in order to work and view the mouth. While seated in this very precarious position, the back is unsupported and the body must compensate with sophisticated maneuvers to get closer to the patient. The end result is that the back ultimately gives out.

Back to Ergonomics

There has been tremendous progression of positioning theories over a very short period of time. It was only in 1988 that ANSI, the American National Standards Institute, emphasized the 90-degree sitting upright posture as the best posture. This position is difficult to maintain, especially

when a clinician needs to get close to a patient, and due to the forward lean, most people do not sit back far enough to get back support in that posture. Currently it is believed that opening the hip angle (formed between the top of the thighs and the abdomen while seated) should approximate 130 degrees.

Even in the forward tilt position, unless the back is supported by the backrest, stress is put on the spine. Ideally, a slight backward tilt would be the most comfortable and perfect position, however, this is impossible in dentistry unless we can get a patient dental chair to be suspended from the ceiling and work under it like a car mechanic works on a lift.

For now only a handful of dedicated chair manufacturers take judicious time to engineer stools that are ergonomically sound. More often, stools that “come with a patient chair” are often not customized, nor ergonomically sound.

Personalized stools come in a variety of styles each as unique as the user. For example, Crown Seating sculpts out the area in the back of the seat pan to relieve pressure on the tailbone and rounds the front sides of the pan to relieve pressure under the thighs which increases blood flow to the lower legs (it’s shaped like a bicycle seat) and especially beneficial for women users. RPG Dental allows for a forward tilt waterfall design, thereby allowing the clinician to maintain a healthy amount of natural lordosis in the lower back. And as another example, Orasoptic was one of the first to utilize armrests to aid in neck and shoulder relief.

Many clinicians are starting to prefer a small, but extra thick lumbar backrest, which provides a proprioceptive quality, allowing continuous feedback to the spine, both in the active as well as the passive position. Conversely, many female clinicians are favoring the saddle-type stool with no backrest because it aids in moving the pelvis into a more anteriorverted



The revolutionary Virtù stool/chair with a ZenWave seat pan has a unique free-floating backrest that aligns the spine, massages the back muscles and improves blood flow to the vulnerable lumbar region.

position. This allows the clinician to sit softly or almost stand while working.

Assembling all the beneficial features noted above into an effective stool/chair was the brainchild of Le Mans racecar winner and owner of Crown Seating, Steve Knight. The new innovative chair called the Virtù was unveiled at the recent Chicago Midwinter Meeting. It has a patented ZenWave motion that provides mild support while in a forward tilt position (which opens the hips to approximately 130 degrees), allows the pelvis to rotate forward in a natural position (which permits the pelvis to be more anteverted) and aligns the spine (keeping it neutral and unstressed) thereby protecting the spine from further injury. The best component is that the backrest moves with the operator in both the active and passive positions, which massages the vulnerable lumbar region, promoting blood flow and nutrients to the lower back muscles and

intervertebral discs. This chair/stool collectively puts all the important and vital components of stool ergonomics together.

We have come a long way from wooden chairs and overstuffed stools. Today, the operator demands more comfort and function while working. But, choosing a stool can be as complex as the spine itself; every body is different. What might work for one body might not work for another. When in the market, try different types of stools for a period of time. See what works for you. ■

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