

# Implant Supported Overdentures

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In 2009, the Canadian government published a summary report on the findings of the oral health component of the Canadian Health Measures Survey 2007–2009.<sup>1</sup> They reported that 6.4 percent of the Canadian population was edentulous between 2007 and 2009. Thus, in 2009, over two million Canadians were edentulous. This demographic represents a huge need for treatment. Although complete dentures were classically the treatment of choice, over the past 10 years there has been significant attention paid to immediate implant-supported full-arch fixed reconstructions. The initial skepticism regarding the validity of these types of

prostheses followed by sound scientific support created an interesting story. Additionally, the marketing potential of “teeth-in-a-day” is significant and patients are much more aware of their treatment options even before speaking to their dental provider. Patients who are facing edentulism may be concerned with the embarrassment of wearing a denture or the lack of function they assume comes with it. Immediate full-arch fixed reconstructions are attractive to these patients because they alleviate some of their initial concerns: the process will be immediate, you won’t have to wear a denture, the esthetics will be customizable and excellent, and you’ll be able to chew well. Although

the truth is not always so promising, the idea is captivating to many potential patients and this service is now commonly offered.

The alternative option to an implant-supported full-arch fixed prosthesis is somewhat less exciting: a removable complete denture. Without implant support, removable dentures often present significant challenges for patients such as poor stability and compromised mastication.<sup>2</sup> In comparison, the success of implant-supported removable dentures has been well established. The McGill Consensus Statement (2002)<sup>3</sup> recommended two implants to support a mandibular denture as a minimum standard of care, citing the poor

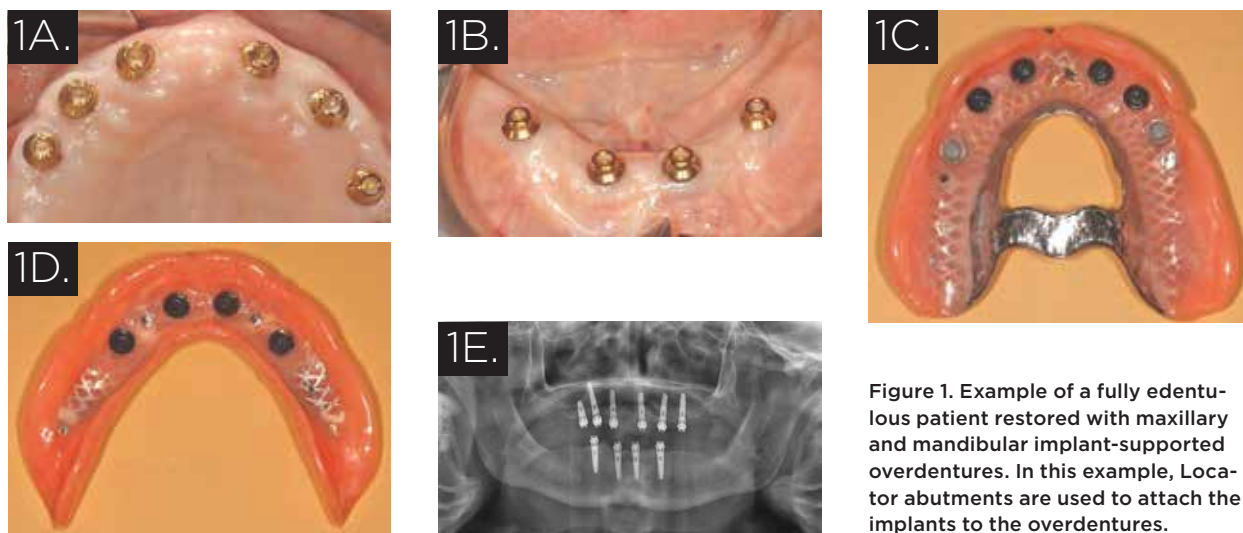


Figure 1. Example of a fully edentulous patient restored with maxillary and mandibular implant-supported overdentures. In this example, Locator abutments are used to attach the implants to the overdentures.

fit and function of many mandibular dentures that were not implant supported. However, most patients who are dentate and face edentulism want a fixed prosthesis, not a removable one. There are many reasons this may be true. Although the esthetics is similar between both options, some patients mistakenly assume a fixed prosthesis will offer superior esthetics. They also assume that fixed prostheses offer better function and satisfaction. But is this really true? In 2007, some of the authors of the McGill Consensus Statement (Thomason et al.) attempted to evaluate this question by reviewing the literature.<sup>4</sup> They found there was no evidence to support fixed or removable being superior. In 2011 De Kok et al. published a pilot study comparing fixed versus removable dentures in the mandible.<sup>5</sup> Their findings suggested equivalence; patients were equally happy and functional with either an overdenture or a fixed denture. This was further evaluated in 2014 by Oh et al. who published a prospective controlled study comparing fixed implant-supported prostheses, removable implant-supported prostheses, and complete dentures.<sup>6</sup> They found that implant-supported prostheses, fixed or removable, were equivalent and superior to conventional dentures for improving oral health related quality of life. The same was true with patient satisfaction; patients were equally pleased whether or not their prosthesis was fixed or removable. Therefore, the choice of whether a patient should have a fixed or removable prosthesis is a patient specific one, dealing more with psychology and cost, rather than superior esthetics or function.

The fixed full-arch prosthesis offers two major advantages: improved stability and their non-removable nature. These are well known and

most patients will be able to cite them. However, the removable full-arch prosthesis also has advantages. The first is a reduced cost. As an example, the ODA fee guide suggests a fee of \$1323 plus lab costs for a removable implant-supported complete overdenture compared to \$8499 plus lab costs for a fixed implant-supported framework. The difference between these treatments is even larger because lab costs are significantly higher for fixed cases. Secondly, when you have a failed implant it is often much easier to manage the case when the prosthesis is removable. Although implant failures are uncommon, the reality is that failures will and do occur. Figures 2 and 3 display examples of fixed and removable full-arch cases that have had implant complications. In general, implant complications with a removable prosthesis are easier to deal with, both for the professional and the patient. Finally, professional maintenance and personal hygiene are easier with implants supporting a removable prosthesis. Although fixed cases can be fabricated so that sufficient access for hygiene is available, some are extraordinarily difficult to clean and simply result in an absence of effective oral hygiene. Poor oral hygiene is a major risk factor for peri-implantitis. Heitz-Mayfield (2010) reported odds ratios that suggest patients with poor oral hygiene have over 14 times the likelihood to develop peri-implantitis.<sup>7</sup> Although evidence may not exist yet, I suspect peri-implantitis to be more common around fixed prostheses primarily due to compromised oral hygiene (Fig. 4). Despite the potential disadvantages discussed above, for many patients a fixed prosthesis will be the right choice. But it should be recognized that a removable implant-supported prosthesis will be the ideal treatment

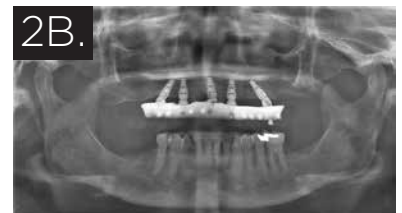
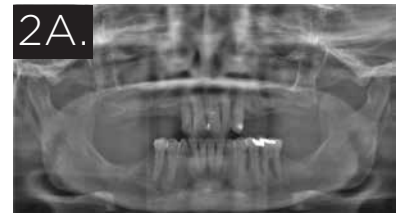


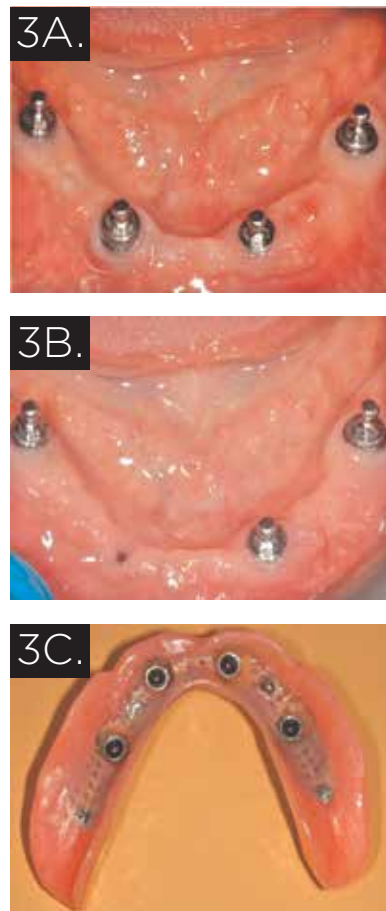
Figure 2. In this fixed case, the final prosthesis was delayed because the anticipated 2.5 implant could not be placed immediately due to poor bone and inadequate initial stability. The immediate provisional prosthesis was adjusted to remove the 2.6 and 2.5, which was frustrating to the patient who displayed the missing teeth when smiling. This provisional was used for seven months before the area had another healed implant at the 2.5 site and could be finally restored.

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for many patients as well.

If a patient has chosen a full-arch implant-supported overdenture, the next question is often how many implants should be placed. This is especially important for overdentures, as patients selecting this option are often financially concerned. Implants for mandibular overdentures are well researched and anywhere from one to four implants can be recommended. The advantage of more implants is in stability and retention. A singular implant allows significant rotation whereas a second implant limits most rotation to the sagittal plane. A third implant prevents significant rotation in all planes and a fourth provides further stability and support. Despite this, a singular mandibular implant can survive and studies have shown similar patient satisfaction compared to two implants.<sup>8,9,10</sup> This evidence is contrary to the recommendation of the McGill Consensus Statement that suggested a minimum standard of care of two implants for an overdenture. Over a decade after the consensus, evidence now exists that suggests the use of a single implant to support a mandibular overdenture is predictable and successful.<sup>8,9,10</sup> This research is still short-term and some of it has suggested a poorer survival rate. In time, more evidence will likely be produced but until then clinicians should be cautious in adopting this treatment approach. When cost is a significant factor in treatment, one mandibular implant is the most cost efficacious choice. However, two to four implants remain an excellent treatment option especially for patients who are looking for a higher level of stability and/or retention.

In the maxilla the common recommendation is four or more splinted implants. Just recently, a systematic review by Ra-



**Figure 3.** A removable implant-supported overdenture in the mandible where the 4.2 implant failed after restoration. The implant was removed and no further treatment was performed. The patient continued to report good function and satisfaction.

ghoebar et al. re-emphasized this position.<sup>11</sup> Unfortunately, systematic reviews are limited to the studies they draw their data from and the data on maxillary implant supported prostheses is limited. Raghoebar's 2014 review, and the version that preceded it by Slot et al. in 2010<sup>12</sup>, both included data for four maxillary unsplinted implants into their  $\leq 4$  unsplinted implant group, combining it with one, two and three implant supported overdentures. As a whole, this group performed significantly worse with higher failure rates than the contrasting  $\geq 4$  splinted implants. Both reviews suggest four or more splinted implants to support a maxillary overdenture. This year, Kern et al. published a similar review and they found the available literature supported four or more implants for maxillary overdentures.<sup>13</sup> They did not distinguish between splinted and unsplinted and cautioned against the use of less than four implants due to higher reported failure rates.

In my private practice, we have placed over 300 unsplinted maxillary implants for overdentures and have data comparing our results against similar mandibular placements (**Fig. 5**). Although retrospective and not well controlled, these results represent “real world” dentistry. Our unsplinted maxillary implants performed similarly to unsplinted mandibular implants with excellent survival rates over one to 20 years. The idea that implants need to be splinted in the maxilla seems to come from old prosthodontic dogma. Overdenture bars can provide additional stability and correct poor implant angulation but they also have a number of downfalls. The most obvious is the additional expense to the patient, ranging from \$1000 to \$2000 depending on the number of implants. Other complications include impaired hygiene and gingival overgrowth (**Fig. 6**). When considering the benefits and costs, it is hard to justify splinting implants with a bar in most cases. I recommend splinting maxillary overdenture implants only where necessary and for cases to generally be unsplinted in both the maxilla and mandible.

Implant-supported overdentures offer a predictable, pleasing and cost-effective long-term solution for edentulous patients. This article has highlighted some ideas that contradict common opinions. Removable and fixed full-arch prostheses provide similar patient satisfaction and maxillary overdentures do not need to be splinted. These concepts allow clinicians to offer more affordable care to the many patients in need of treatment.

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Dr. Mark Nicolucci graduated from the University of Western Ontario School of Dentistry in 2006 and continued his education at a residency program at Temple University in Philadelphia. In

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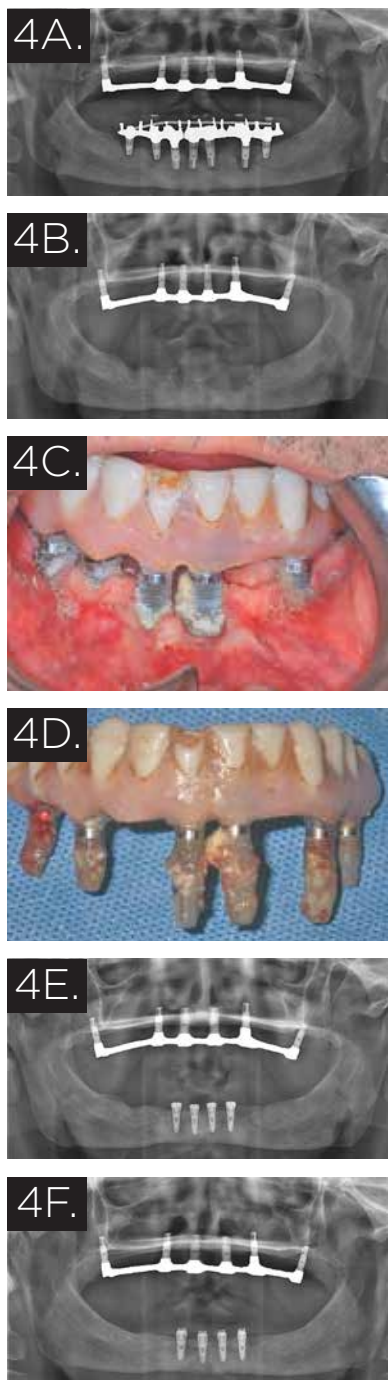


Figure 4. A mandibular fixed prosthesis supported by seven implants that all failed. The patient confessed to neglecting his oral hygiene because he felt he could not perform it properly. The patient was retreated with four mandibular implants with Locator abutments to support an overdenture.

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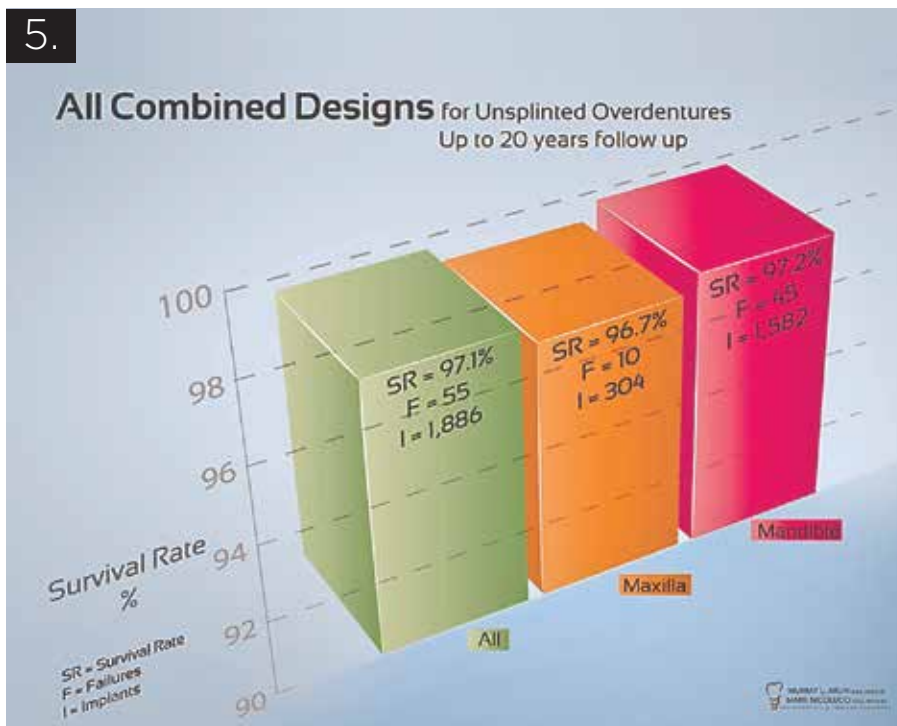


Figure 5. Bar graph of the retrospective assessment comparing implant survival of maxillary and mandibular implants when used for unsplinted overdentures.

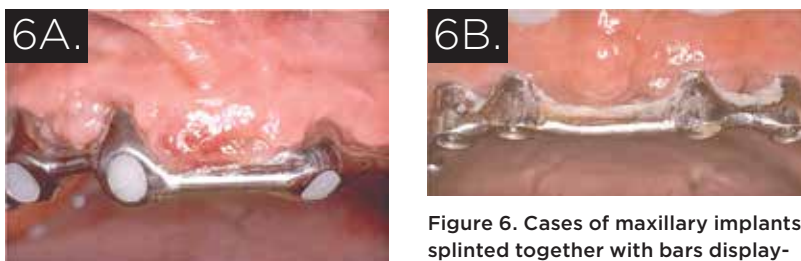


Figure 6. Cases of maxillary implants splinted together with bars displaying gingival hyperplasia and poor oral hygiene.

2010, he graduated from Temple's Periodontology program with a certificate in Periodontology and Oral Implantology. He has a Masters in oral biology and is a diplomat of the International Congress of Oral Implantologists. Since returning to Canada, Dr. Nicolucci has been active in lecturing and attending seminars both locally and internationally. He currently practices with Dr. Murray Arlin in West Toronto.

Oral Health welcomes this original article.

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