CLINICAL TIP

Bone Quality Based Drilling Protocol: Achieving High Primary Stability

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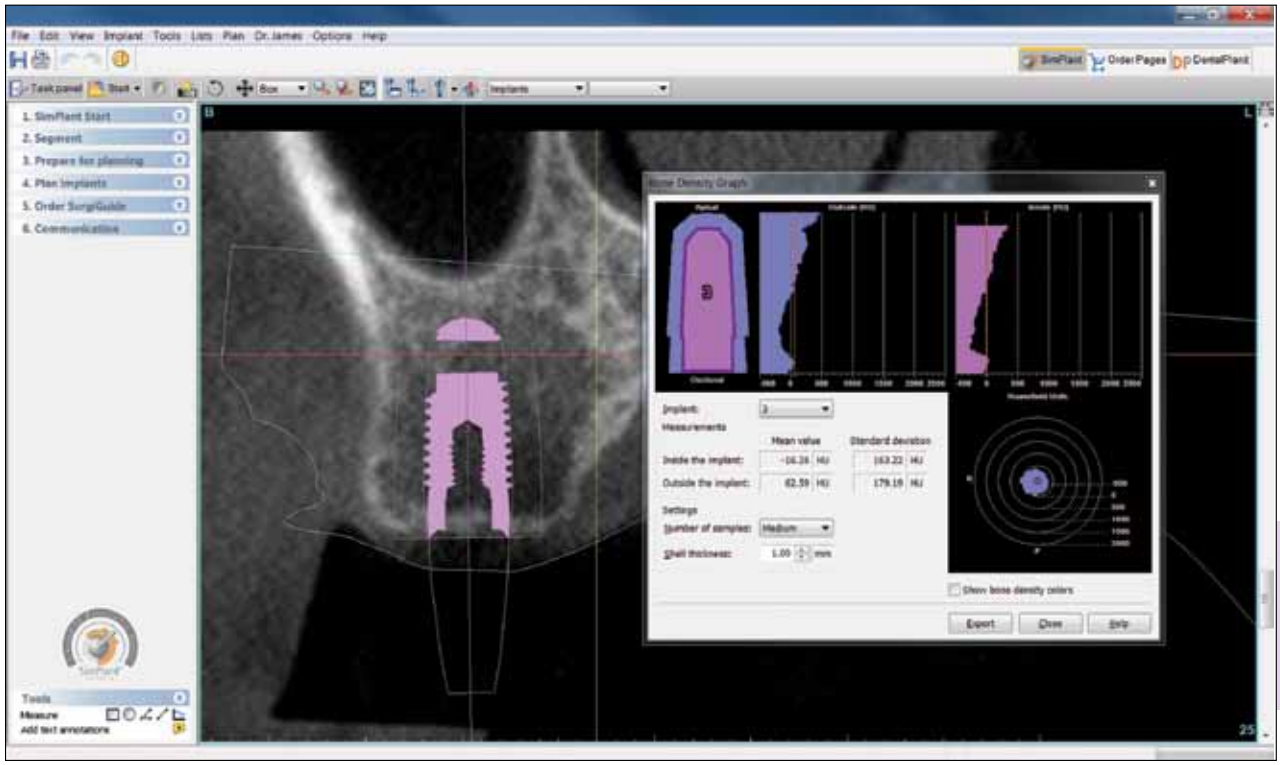

Figure 1: *Planning software used to evaluate relative bone density showing Type IV bone*

ONE OF THE MOST FUNDAMENTAL PROCEDURES performed by implant surgeons is the creation of the osteotomy for implant placement. Without a well-developed osteotomy site, both the immediate surgical and future restorative success of the case can be compromised. There are various factors that must be considered when performing the osteotomy, such as location, angulation, and spacing for multiple implants. Critical decisions to be made concern the choice of whether to follow the soft or dense bone protocol for a given case, and whether to utilize a bone tap drill. The goal is to achieve high primary stability, at least 35 Ncm, at the time of implant placement. This will also impact the decision whether to immediately provisionalize the case.

As with most things implant-related, assessment of the preoperative bone quality and quantity is critical to planning the osteotomy. If using conventional radiography, such as periapicals and panoramics, evaluation of the trabecular pattern of the bone, the amount of cortical versus cancellous bone, and the vertical height of the bone can often indicate the likely density of the underlying bone. The use of cone beam computed tomography (CBCT) and digital treatment planning software can provide an even clearer preoperative assessment of the bone to be drilled, by allowing the surgeon to examine the bone three dimensionally, and providing a Hounsfield or relative density scale of a planned osteotomy site *(Fig. 1)*. By carefully considering all of these factors, the surgeon often has a sense of which drilling protocol will be

used before the patient even presents for the surgery. As is often the case, however, many surgical decisions are made intraoperatively. In essence, sometimes even the best-laid plans need modification.

A good rule of thumb in osteotomy preparation is to start small and advance as needed. In other words, drill to the manufacturer's recommendations for your specific implant system for soft bone. Once you have done so, if you feel that the bone was particularly difficult to penetrate with the drills, or, when you attempt to place the implant, it does not easily advance to full depth, then it is typically advisable to enlarge the osteotomy diameter with the dense bone drill. The potential dangers in not having an adequately sized osteotomy include: damaging the implant connection during placement, not fully seating and properly positioning the implant in the bone, and creating excess pressure on the surrounding bone. All of these are detrimental to the long-term success of the implant and restoration. Some surgeons advocate drilling to the dense bone diameter in all cases. This is certainly an option, but the risk is that you could compromise the amount of initial stability that you achieve and that the drill or the implant could be displaced into an unfavorable location due to loss of resistance and torque. So, again, it is at the discretion of the surgeon.

Screw taps are used in cases of extremely dense bone, Type I and perhaps Type II. Essentially, the screw taps precisely mimic the thread patterns of the proposed implant. Therefore, by tapping the bone with these specialized drills, the internal configuration of the osteotomy is identical to that of the threads of the planned implant. This allows for a more passive, complete placement of the implant with less insertional torque, and is therefore gentler to the surrounding bone. Many implants today purport to be self-threading or tapping, often eliminating the need for the screw tap. But in those instances where the bone is particularly dense, screw taps are useful. The screw tap may be used as an alternative to, or in conjunction with, the dense bone drill.

There is a great deal of latitude in the choice of whether to utilize the soft or dense bone protocol, as well as whether to use a screw tap *(Fig. 2)*. From pre- and intraoperative evaluation of the bone quality and density, to the decision to precisely shape the internal anatomy of the osteotomy site with a screw tap, a variety of factors must be considered to create the ideal osteotomy and achieve good implant primary stability. But the extra time and attention to detail needed to make that informed decision will be rewarded with simpler surgeries and long-term restorative success. **IM**

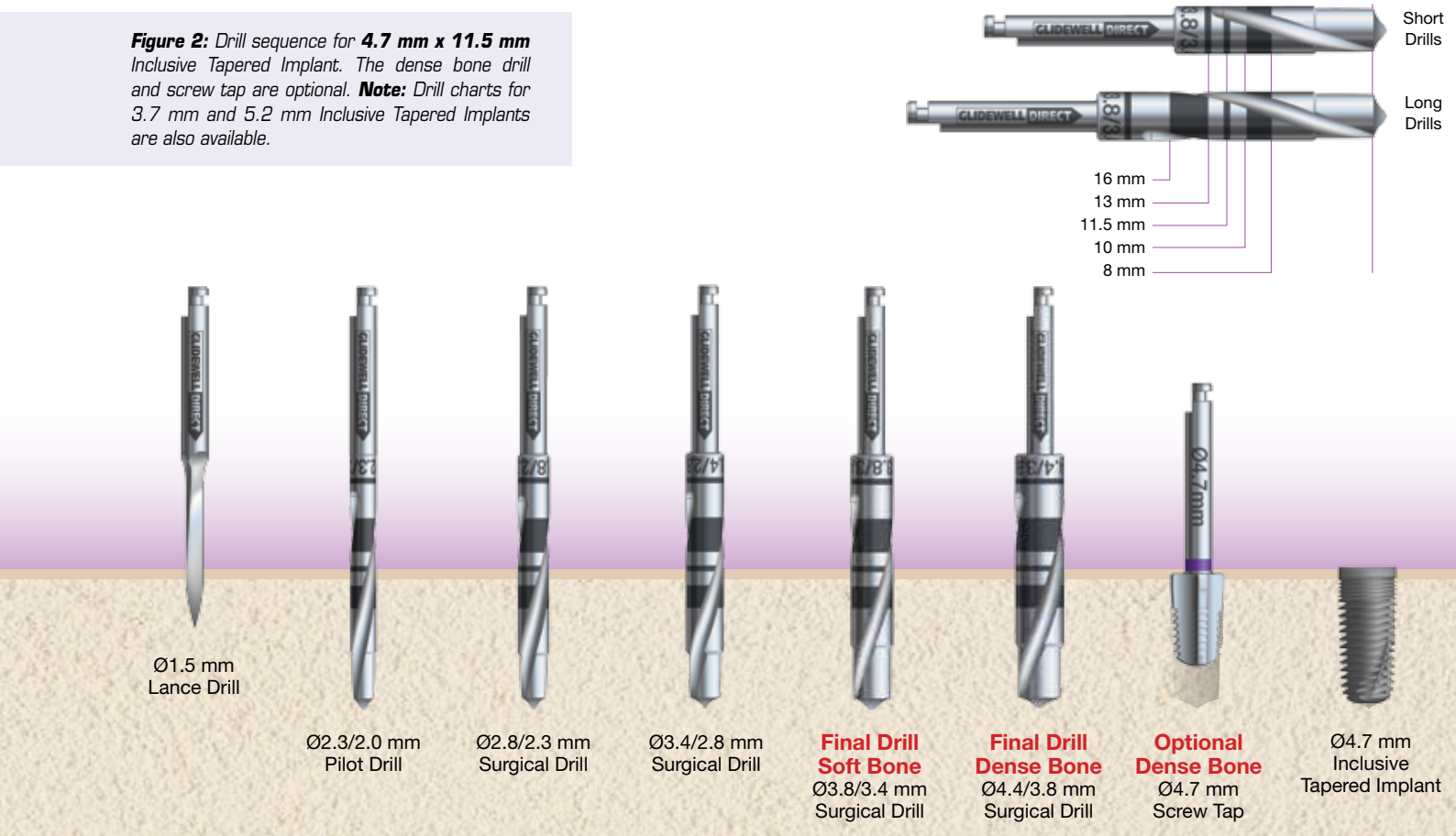

Figure 2: *Drill sequence for* ***4.7 mm x 11.5 mm*** *Inclusive Tapered Implant. The dense bone drill and screw tap are optional.* ***Note:*** *Drill charts for 3.7 mm and 5.2 mm Inclusive Tapered Implants are also available.*