Immediate implant placement at multirooted molar sites involves a series of site-specific anatomical challenges, including implant bed preparation in the presence of interradicular bone septa. The aim of this article is to present and discuss a novel approach that gives improved guidance during implant bed preparation for immediate implants at multirooted extraction sites in both the mandible and maxilla. Following decoronation of the concerned teeth, osteotomies were performed directly through the teeth’s initially retained root complexes. After completion of the drilling protocol, the remaining root aspects were extracted, and treatment was continued in the usual manner. With the osteotomy drills stabilized and guided by the retained root aspects, this approach allows for precise positioning and angulation of the implant bed preparation, thus enabling ideal implant positioning during immediate implant placement at multirooted extraction sites. (Int J Periodontics Restorative Dent 2013;33:88–95. doi: 10.11607/prd.1444)
extractions sockets or reduced bone heights apical to the socket fundus. Implant bed preparation in the presence of interradicular bone septa may also prove challenging. In the authors’ experience, this working step often turns into a clinically challenging procedure since the osteotomy drill may deflect from the ridge or surface of the bone septa, making ideal implant positioning with respect to prosthetic as well as hygienic aspects difficult. The aim of this article is to present and discuss a novel approach that gives improved guidance during implant bed preparation for immediate implants at multirooted extraction sites.

Case report

Patient 1

A 71-year-old man with a noncontributory medical history presented with a mandibular left first molar that was intended to be replaced by an implant because of an untreatable endodontic pathology (Figs 1a and 1b). The treatment plan designated an immediate treatment approach.

Following local anesthesia, the first molar was decoronated using a Lindemann burr at the level of the gingival margin (Fig 1c). Subsequently and without any flap elevation, the osteotomies were performed directly through the tooth’s initially retained root complex, i.e., pre-extractive interradicular implant bed preparation (Fig 1d). The retained root aspects guided the osteotomy drills and allowed for precise positioning and angulation of the implant bed preparation with respect to the emergence profile of the tooth (Figs 1e and 1f). The drilling depth was extended beyond the fundus of the socket in compliance with the preoperative radiographic assessment. After completion of the drilling protocol according to the manufacturer’s instructions, the remaining root aspects were carefully extracted using a desmotome and clamps (Figs 1g and 1h). The extraction socket was thoroughly
curretted, and a cylindric screw-type dental implant (5 × 11 mm; SPI ELEMENT, Thommen) was inserted (Fig 1i). With the coronal margin of the implant’s endosseous surface placed underneath the ridge of the interradicular bone septum, the shoulder of the implant was positioned slightly apical to the level of the buccal alveolar crest (Fig 1j). Adequate insertion torque and sufficient primary stability allowed for a nonsubmerged healing approach, and a healing abutment was connected to the implant (Fig 1k). Since the patient refused bone augmentation, no additional treatment was applied to the existing peri-implant defect, but sutures were placed to approximate wound margins and avoid food impaction.

Healing was uneventful. Chlorhexidine rinses were prescribed three times a day for 1 week, and the patient was instructed to avoid mechanical trauma and toothbrushing at the surgical site. Analgesic-antiphlogistic medication was prescribed as required (ibuprofen). The sutures were removed after 1 week. Five months after the surgical intervention, the patient presented with healthy peri-implant tissue conditions, and the prosthetic treatment was completed (Figs 1l and 1m). Final impressions were taken, and an all-ceramic screw-retained implant crown served as the definitive restoration (Figs 1n and 1o).
Patient 2

An 83-year-old woman with a non-contributory medical history needed to have her maxillary right first molar replaced with an implant because of a vertical root fracture. The treatment plan called for immediate implant placement in conjunction with internal sinus floor elevation (Fig 2a).

Pre-extractive interradicular implant bed preparation was performed according to the aforementioned protocol (Fig 2b). After completion of the drilling process, a friction-free osteotome technique was employed for internal sinus floor elevation (Fig 2c). The remaining root aspects were extracted, and bone graft (Bio-Oss, Geistlich) was placed to elevate the sinus membrane as well as augment the peri-implant defect that became evident after insertion of the implant (5 × 9.5 mm; SPI ELEMENT, Thommen) (Fig 2d). The implant was allowed a non-submerged healing period of 5 months (Fig 2e).

Healing was uneventful. The postoperative regimen was the same as described for the first patient, but this patient was additionally prescribed antibiotic treatment (clindamycin). Following successful osseointegration of the implant, the prosthetic treatment was completed with an all-ceramic screw-retained implant crown placed as the definitive restoration (Figs 2f and 2g).
Discussion

The case presentations in this article demonstrate a novel approach that allowed for improved guidance during implant bed preparation for immediate implants at multirooted molar sites. With the osteotomy drills stabilized and guided by the retained root aspects, this new technique allows for precise positioning and angulation of the implant bed preparation in the presence of any interradicular bone septa at multirooted extraction sockets.

Immediate treatment approaches are gaining popularity in implant dentistry. A series of advancements, particularly regarding innovations in implant design and surface characteristics, have allowed for immediate implants to become a well-accepted alternative to conventional treatment protocols in implant dentistry. With careful patient selection and accurate clinical procedures, immediate implants perform predictably well and achieve survival rates that are comparable to those of delayed implants placed in healed sites. With respect to immediate implants at maxillary or mandibular molar sites, Atieh et al evaluated data from 1,013 implants in nine studies and reported implant survival rates ranging from 93.9% to 100% over an observation period of 12 to 133 months, with an overall pooled survival rate estimate of 99.0%. In another recently published review on immediate implants, Lang et al documented comparable high survival rates for posterior implants, with an overall pooled survival rate estimate of 98.9% after 2 years.

Beyond survival rates, however, evidence for the success and long-term prognosis of immediate implant placement at molar sites is rather scarce. Nevertheless, besides some patient- and treatment-related aspects, the long-term prognosis and success of any dental implant is substantially associated with sufficient oral self-care and continuous professional maintenance. This in turn demands a prosthetic design that is cleanable for the patient as well as accessible for professional maintenance and peri-implant probing. The realization of ideal implant positioning therefore emerges as an important aspect of clinical relevance. The presence of any interradicular bone septa may hamper ideal implant positioning in the case of immediate implant placement at multirooted molar sites, and pre-extractive interradicular implant bed preparation may be regarded as a useful tool to counteract this clinical difficulty. Moreover, it should be noted that when this technique is applied, the initially retained root complex serves as an ideal template for the emergence profile of the tooth to be replaced.

Various technical approaches are available to provide optimal implant positioning through use of surgical templates that are either based on conventional radiographic templates or on cone beam computed tomography and computer-assisted three-dimensional implant planning. In the authors’ experience, however, the use of a surgical template does not reliably prevent the osteotomy drill from deflecting from the ridge or the surface of existing interradicular bone septa at multirooted extraction sockets. In this context, pre-extractive interradicular implant bed preparation may not be regarded as an alternative to the use of surgical templates but rather as a possible additional tool to template-guided implant surgery. Overall, the range of indications for this novel form of implant bed preparation may include any maxillary or mandibular multirooted premolar or molar sites designated for immediate implant placement, but possible limitations include situations of severe periodontal attachment loss with unsuitably high tooth mobility.

Drilling through the dentin of retained root aspects appears to be similar to drilling through tissue slightly harder than dense cortical bone but ultimately is without any specific difficulty. This confirms the results of Davarpanah and Szmukler-Moncler, who reported on implant placement in contact with ankylosed root fragments. In this context, it is recommended to use new drills when pre-extractive interradicular implant bed preparation is to be employed.

The clinical application of this technique may raise concern about the risk of a deleterious reaction caused by drill debris displaced in the socket or in the osteotomy. For this reason, the authors recommend to thoroughly curette the site prior to insertion of the implant.
whereupon care should be taken to remove all existing endodontic filling material. While remnants of endodontic filling material may potentially serve as a local source of irritation, it is well documented that debris originating from the tooth structure or the tooth itself seems not to interfere with implant integration but is rather expected to become involved in local bone turn-over.

Following tooth extraction, particularly extraction of multirooted molar teeth, the socket usually presents with dimensions that are considerably larger than the diameter of dental implants. As a consequence, immediate placement of implants into fresh extraction sockets consistently results in a certain peri-implant marginal defect between the implant and walls of the socket. Therefore, in the literature, a variety of clinical approaches have been advocated to combine immediate implant placement with different regenerative procedures, even though it has been demonstrated that regenerative treatment is not necessary for improved healing or successful osseointegration of immediate implants. However, in an animal model, Araújo et al demonstrated that the placement of deproteinized bovine bone mineral in the gap between an implant and the walls of a fresh extraction socket provided additional amounts of hard tissue formation and improved the level of marginal bone-to-implant contact. In this context, the authors prefer to use Bio-Oss as the grafting material for augmentation of peri-implant defects that become evident after immediate implant placement. Moreover, in regard to pre-extractive interradicular implant bed preparation being considered a concept that encourages flapless surgery, the authors recommend the situational use of sutures to approximate wound margins to avoid food impaction and allow for proper clot maturation.

The authors’ experiences with this new technique are based on an increasing number of at least 15 clinical cases. The first 15 consecutive cases included both maxillary and mandibular multirooted extraction sites, out of which 3 maxillary sites were treated in conjunction with internal sinus floor elevation. Pre-extractive interradicular implant bed preparation was successfully applied in all 15 cases without any adverse events. Flapless surgery was always performed. All but 1 of these cases were treated with Bio-Oss as the grafting material for augmentation of peri-implant defects and, if required, for augmentation of the sinus. Adequate insertion torque and sufficient primary implant stability allowed for nonsubmerged healing in all cases. This may be attributed to the interradicular bone that could be routinely preserved in the lateral aspects of the implant drill hole, so the bone apical to the fundus of the socket may not have been the only factor that contributed to implant anchorage. All implants showed successful osseointegration after an uneventful healing period of 5 to 7 months.

**Conclusion**

This novel form of implant bed preparation may be regarded as an uncomplicated but useful modification of the standard procedure that allows for ideal implant positioning during immediate implant placement at multirooted extraction sites.

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**References**


