wise bone grafting would have been indicated.

This paper aims to explain the indications for the All-on-4 system treatment, which maneuvers around the anatomical limits and risks and allows in a small amount of time to accurately perform implant treatments for fully edentulous jaws.

**Materials and methods**

The All-on-4 concept is based on the optimal number of four implants for supporting an edentulous jaw with a complete arch prosthesis. The concept benefits from posterior tilting of the two distal implants, which offers a minimum of 10 teeth in the immediately placed prosthesis with a maximum of one-tooth distal cantilever. The procedures are described elsewhere and here we offer a summary of the protocol.

- **Inclusion/exclusion criteria**

  The patients undergo medical history, clinical observation and complementary radiographic exams of panoramic X-ray (bone height) and a CT-scan (bone quality and bone volume). For the mandible, the anatomical inclusion criterion is a bone ridge of a minimum 4 mm width and maximum 8 mm height in the interforamina area.

  For the edentulous maxilla, the height and width of the residual crest bone available between the anterior walls of the maxillary sinus for the maxilla and between the mental foramina for the mandible will establish the type of All-on-4 surgical approach: All-on-4 Standard, All-on-4 Hybrid or All-on-4 Extra-Maxilla.

  For the All-on-4 Standard, the anatomical inclusion criterion is a bone ridge of a minimum 4 mm width and maximum 10 mm height from canine to canine. The All-on-4 concept can be used at different degrees of maxillary atrophy as the position of the posterior implant is the determining factor for the interimplant distance.

  Depending on the degree of resorption, the posterior implant head will emerge at different positions at the bone crest, normally between the first premolar [high resorption (Fig. 1)] and the first molar [moderate resorption (Fig. 2)]. If the above criteria are not met, then an All-on-4 Hybrid or All-on-4 Extra-Maxilla should be considered. In the All-on-4 Hybrid rehabilitation, maxillary anchored implants are used in conjunction with extra-maxillary anchorage implants (anchored in the zygomatic bone) (Fig. 5), whereas in All-on-4 Extra-Maxilla, only four extra-maxillary anchorage implants are used (Fig. 4).

**Surgical protocol**
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• Medication
The surgical procedures for both jaws were performed under local anesthesia with mepivacaine chloride with epinephrine 1:100,000 (Scandinibsa 2 percent®, Inibsa Laboratory, Barcelona, Spain). All patients were sedated with diazepam (Valium® 10 mg, Roche, Amadora, Portugal) prior to surgery. Antibiotics (amoxicillin 875 mg and clavulanic acid 125 mg, Labesfal, Campo de Besteiros, Portugal) were given one hour prior to surgery and daily for six days thereafter.

corticosteroid medication (prednisone [Meticorten® Schering-Plough Farma, Lda, Agualva-Cacém, Portugal], 5 mg,) was given daily in a regression mode (15 mg to 5 mg) from the day of surgery until four days postoperatively. Antiinflammatory medication (ibuprofen, 600 mg, Ratiopharm, Lda, Carnaxide, Portugal) was administered for four days postoperatively starting on day four. Analgesics (clonixine [Clonix®, Janssen-Cilag Farmaceutica, Lda, Barcarena, Portugal], 500 mg,) were given on the day of surgery and postoperatively for the first three days if needed. Antacid medication (omeprazole, 20 mg, Lisboa, Portugal) was given on the day of surgery and daily for six days postoperatively.

• Flap procedure
The implants and abutments are placed in one position at a time, starting with the two posterior locations. The implant placement is assisted by a special guide, designed by the author (P.M.) (Fig. 5). The guide is placed into a 2 mm hole made at the midline of the jaw and the titanium band is bent so the occlusal centerline of the opposing jaw was followed. By this, it is possible to guide the implants to be placed in the center of the opposing prosthesis and at the same time to find the optimal position and inclination for best implant anchorage and prosthetic support.

The insertion of the implants (Brånemark System®; Nobel Speedy®, Nobel Biocare AB; Gothenburg, Sweden) follows standard procedures, except that under-preparation is used when needed to get a final torque of more than 40 Ncm before the final seating of the implant. Countersinking is used only when needed to create space for the head of the tilted implants and/or to secure both buccal and lingual cortical bone contact at the implant head in thin bone crests. The preparation is typically done by full drill depth with a 2 mm or a 2.5 mm twist drill (depending on bone density), followed by a widening of the entrance in the cortical bone with a 3 mm twist drill and an adjustment with the countersink, if needed.

The implant neck is positioned at bone level, and bicortical anchorage is established whenever possible (Fig. 6). The length of the implants varies from 10 mm to 18 mm. In case of immediate extraction, the sockets are made free from soft tissue remnants and cleaned to avoid infection. In case of periodontitis on the lower incisors, extraction, curettage and bone shaping is performed and virtually no socket is left. After closing and suturing the flap with 4–0 non-resorbable suture, the access to the abutments is opened by a punch and impression copings are placed.

Implant placement in the mandible: In the mandible, a supraperiosteal flap is raised along the top of the ridge in the intermen- tonian area. The two most anterior implants follow the jaw anatomy in direction, which in severe resorption cases means a posterior tilting. Two