Severe maxillary and mandibular bone atrophies are nowadays successfully treated with bone regeneration techniques and bone grafting techniques.

However there are clinical cases in which such techniques cannot be performed for a number of different clinical reasons such as severe diabetes, other metabolic disorders, cancer, etc., or more simply because the patients reject this type of surgical approach for strictly personal reasons such as significant budget problems or to face a very invasive surgery.

It should be evident that people wearing dentures are unstable because of a severe bone atrophy do live an amputee syndrome, having lost the function of a basic organ: their mouth.

This type of inability causes progressive speech and food-chewing problems, with nutritional deficiencies and loss of body weight. These conditions often cause psychic depression and/or permanent anxiety requiring specialized medical care.

This type of inability is unrecognised or underestimated when it affects very old people, and given for granted because of the age of the patients. On the contrary, this inability becomes dramatically evident when it affects middle-aged people or much younger people.

In this article, some clinical cases of severe bone atrophy were selected. None of these cases could be treated with bone grafts. On the contrary, these patients were all surgically treated with subperiosteal implants supporting full arch dentures, which proved to be perfectly stable in any condition and circumstance since the very beginning. All these patients recovered very rapidly from the psychic depression and progressively regained normal physical conditions.

A brief panoramic overview of these clinical cases is the aim of this article to provide evidence that full arch dentures firmly anchored and supported by subperiosteal implants represent today a valid treatment option to let these patients regain the function of their mouth with a 360-degree perspective: chewing function, speech, smile, and facial aesthetics.
Evidence will be provided that all such patients were brought back to normal life standards with a minimally invasive surgery if compared to any full-arch bone graft surgical approach, at lower costs for both patient and dentist, with totally predictable and rapidly achieved final results which entirely fulfilled the functional and aesthetic demands of the patients.

Case 1.

Female patient, age 52 years, looking indeed much older (Fig. 1). Heavy smoker since decades, she wears a very unstable full palate upper denture. She refers to have lost several implants over the last years, and that recently she had received bilateral sinus lift and implants, which both failed immediately after the ceramic bridges, had been loaded. The patient also reports that soon after the implants and bridges had been removed, she has received bilateral bone grafts that also failed and had to be removed. The patient appears to be evidently depressed, explaining that at present she observes a strictly self-confined life, away from any social contact, because of her totally unstable and thick upper denture. In fact, the patient must remove the denture in order to perform an intelligible speech. She firmly rejects any additional surgery based on bone regeneration or bone grafts.

CAT scans and a stereolithographic model reveal the extent of the disastrous bone atrophy of the patient's maxilla (Fig. 2): the red line on the very flat palatal vault indicates where the centric occlusion should be “if” she had, an alveolar bone left where to put screw type implants.

The patient accepts to receive a subperiosteal implant surgery as her “last shore” to wear a stable implant supported upper denture. Two separate subperiosteal mesh (Fig. 3) are made to work united in the maxilla (Fig. 4). The surgical flap open (Fig. 5) reveals a perfect correspondence between the STL model and the real bone. The OP right after surgery (Fig. 6) shows that both subperiosteal mesh are well interconnected an perfectly in situ. The bar (Fig. 7) provides adequate support to the removable U-type final denture (Fig. 8).
Case 2.

Female patient, age 58. She declares to possess an anxious and insecure personality, to be very jealous of her much younger and handsome husband, bank director, who is daily surrounded by young and nice looking female secretaries.

She refers that due to the bone atrophy affecting her upper maxilla; three different surgeons have all proposed to give her a fixed full arch bridge, first by increasing her bone volumes with important bone grafts, and later by placing screw type implants in the grafted bone to retain the bridge. The patient frankly admitted that she had firmly rejected 3 times this surgical option not because of the proposed economical budget (“money is not the problem”), but simply because she was terrified by this type of surgery.

At the same time the patient declares that she receives in either one-way or another a fixed dentition enabling her to live a “normal and satisfactory marriage life” with her husband, or she would be firmly decided to commit suicide.

CAT scans and STL model led to create two separate maxillary mesh (Fig. 9) which were then placed in the maxilla of the patient (Fig. 10) and connected to act together (Fig. 11) and support a fixed full arch aesthetic prosthesis (Fig. 12 and 13). The surgery was uneventful. A postcard sent to dentist from the Caribbean Islands with three words, “second happy honeymoon!” confirmed that the work he had performed was successful.

Case 3.

Female patient, age 67 years, very unsatisfied by her unstable removable upper denture. She refers to be perfectly informed about the bone grafting procedures, which would be necessary to give her a fixed implant, supported full arch prosthesis. She makes it very clear that she rejects any bone grafting surgical approach, yet she asks for a fixed full arch dentition, possibly supported by a subperiosteal implant, this surgical procedure having been explained to her elsewhere.

CAT scans and a STL model testify the degree of her bone atrophy. A full arch subperiosteal implant is designed (Fig. 14) and casted in Ti grade 5 (Fig. 15), surgically placed in situ with an uneventful surgery (Fig. 16). A fixed full arch
Fig. 10: The right mesh in-situ secured to the maxillary bone by the screw of osteosynthesis.

Fig. 11: The two titanium mesh in situ matched together by the central joint and secured to the bone by two screws of osteosynthesis.

“all on four” prosthesis is then made which well answers all the functional and aesthetic demands of the patient. (Fig. 17, 18, 19, 20, 21)

Case 4.

A 40 years old female patient affected by insulin-dependent diabetes since the age of 5 years had lost all her teeth over the years. Due to severe bone atrophy, the last dentures were dramatically unstable, particularly in the mandible.

The patient, well informed that a subperiosteal implant approach would be the only remaining option, was addressed to Dr. G. Cortese in Torino.

The CAT scans and the stereolithographic model (Fig. 22) of the patient’s mandible induced Dr. G. Cortese to choose a subperiosteal tripod implant according to L.I. Linkow as the most adequate implant to solve her problems. Both the surgery and the construction of the final
Fig. 12: The two titanium mesh in-situ matched together by the central joint and secured to the bone by two screws of osteosynthesis.

Fig. 13: Provisional full-arch prosthesis cemented on the six posts of the subperiosteal mesh.

Prosthesis proved to be almost totally uneventful (Fig. 23, 24); the patient quickly recovered from her psychic depression and regained a normal body weight, as her final removable prosthesis proved to be firmly supported and anchored to the tripodal subperiosteal implant, yet easily removable for oral hygiene. (Fig. 25, 26, 27).

Conclusions

CAT scans based stereolithographic 3D models, 3D printers, and laser melting machines are all so reliable today to allow the dentist to simulate the entire surgery, to prepare and test the stability of the subperiosteal implants and even parts of the final denture, and then perform an absolutely safe and predictable single stage surgery: the patient arrives to the dental office soon in the morning with his totally unstable denture and walks out of the office at lunch time or in the early afternoon with a reasonably stable provisional denture. In 15-20 days the soft tissues have healed nicely and the patient can wear his final denture.

In some cases, the final denture is delivered and applied to the patient at the very end of the surgery, and rebased a few weeks later if minor adjustments are necessary.
Fig. 14: The design of the full-arch subperiosteal mesh on the stl model

Fig. 15: The rough structure of the subperiosteal implant before millings and polishing lab phases

Fig. 16: The four posts and their large and solid bases surrounded by adherent gingival mucosa

All such reasons provide evidence that the subperiosteal implant technique is not only perfectly tailored to surgically treat the cases shown, in fact it should be considered to be the most suitable implant treatment today in all cases of severe full arch bone atrophy.
Predictability, minor costs for both patient and dentist, rapidly achieved final results, immediate functional load of the prosthesis, patient comfort right after surgery, single stage surgical session, no hospital recovery: indeed a sum of positive factors for all kinds of patients regardless of the age.

Last but not least, the millions of aged people with maxillary and/or mandibular bone atrophy within the growing number of the elderly population of any socially and culturally advanced country, from the
U.S.A. to Europe, from Far East countries to Japan and China, are themselves a strong argument to highlight the crucial importance to finance and promote further research on subperiosteal implant materials and devices, and surgical technique.