Case Report

THE SINGLE-BLADES IN THE POSTERIOR SECTORS OF THE JAWS

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ABSTRACT

Single-blade implants, developed in the early 1970s as an evolution of Professor Leonard I. Linkow's original blade design, provide a practical and long-lasting solution for tooth replacement in narrow ridges, particularly in the posterior sectors of the jaws. Their wedge-shaped configuration enables engagement of both superficial and deep cortical bone, ensuring immediate stability and allowing for early prosthetic loading. This article reviews the historical background of single-blade implants, including the surgical refinements introduced by Professor Ugo Pasqualini, and presents detailed clinical protocols for their placement. A documented case demonstrates functional success after 20 years, while a series of 10 posterior mandible single-blade implant prostheses confirms consistent outcomes across patients. Compared with bone augmentation procedures required for screw implants, single-blade implants exploit residual native bone, minimize surgical invasiveness, and preserve long-term function. When correctly indicated and executed, single-blade implants remain a reliable and durable treatment option for posterior dental rehabilitation.

KEYWORDS: *thin bone crest, wedge form implants, native bone, cortical bone stabilization, minimally invasive implantology, blade implant surgery, bone preservation*

INTRODUCTION

The world of dental implants has undergone significant changes over the years, particularly with the introduction of blade implants. These remarkable devices have transformed the way dentists approach tooth replacements for patients with narrow bone ridges. The use of single-blade implants in the posterior sectors of the jaws is a highly effective and practical solution for restoring missing teeth, offering numerous benefits and long-lasting results.

Blade implants were first developed by Professor Leonard I. Linkow in the 1960s, who recognized the need for a solution to narrow ridges that could not accommodate traditional screw implants. These unique implants are designed to fit into thinner areas of bone, providing immediate stability and allowing for the quick placement of prosthetic crowns. For example, in the case of a 43-year-old female patient, a blade implant was successfully inserted to replace missing molars. After 20 years, the implant-prosthesis continues to function efficiently, demonstrating the reliability of this technique.

Another important figure in the field, Professor Ugo Pasqualini, made significant contributions to the development of blade implants by creating designs that could be adjusted during surgery to better fit the patient's unique bone structure. This innovation has proven crucial in achieving successful outcomes, as evidenced by a clinical case where

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a blade implant was cut to fit the specific anatomy of a patient's ridge, remaining in place and functioning well for over 50 years.

The advantages of single-blade implants extend beyond their design. They provide a minimally invasive option for patients with thin bone ridges, which often occur after tooth extractions. By using blade implants, dentists can avoid more complicated procedures, such as bone grafting, making the experience easier for patients. Additionally, the ability to load these implants immediately with a prosthetic crown allows for quick restoration of function and aesthetics.

In summary, single-blade implants are an excellent option for patients needing tooth replacements in the posterior sectors of the jaws. Their design, ease of use, and long-term success make them a valuable tool in modern dentistry. Encouraging the use of this technique can lead to better outcomes for patients and a more efficient dental practice. Emphasizing the importance of proper surgical techniques and patient-specific solutions will ensure that the benefits of blade implants are realized for years to come.

History

The blade implants were invented and promoted during the sixties by Professor Leonard I. Linkow, one of the brightest minds of contemporary medicine. The main indication for blade implants is the narrow ridges, for which a screw implant is too wide. Professor Linkow used to insert multiple blades and load them immediately with a full-arch fixed prosthesis (1). Three interventions of this kind were performed by him in front of the audience at the 1973 Chicago Midwinter Meeting, relining a fixed resin prosthesis on the blade implants immediately after insertion (2).

Initially, only extension blades were used. The single-blade implant for a single crown was experienced a bit later, at the beginning of the seventies. The single-blade implant shape, suitable for this use, is not extended but is deep enough to reach the deep cortex (3). As a matter of fact, as for the root-form implants, reaching the deep cortex is suggested for numerous reasons:

1. best crown root ratio;
2. immediate download of functional forces on a resistant bony pavement;
3. maximum immediate stability (4).

Prof. Linkow was followed closely by Prof. Ugo Pasqualini, another brilliant mind in the field of oral implantology. Prof. Pasqualini developed a personalized interpretation of the blade implant, which could be cut during the intervention to accommodate any variation in the ridge anatomy. One implant of this kind was cut to fit and replace the missing anterior superior root of a central incisor, with the intervention documented through pictures and X-rays. This implant has been in place for 50 years and is still functioning perfectly after 53 years. This clinical case represents the oldest reliable documentation of a single implant-prosthesis (5).

Numerous single implants of this kind, when correctly inserted, result in long-lasting (6). If the ridge is thin, individual blades can be inserted closely together (Fig. 1).

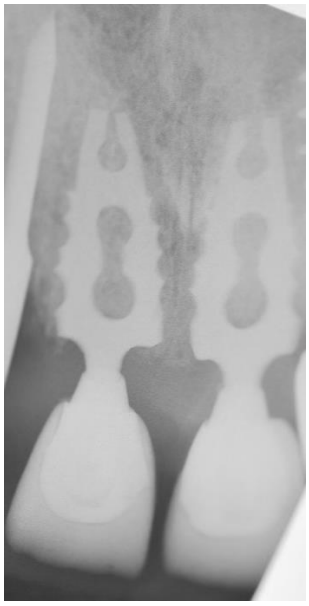

Fig. 1. *Radiograph of two Pasqualini single-blades with single prosthetic crowns 23 years after insertion and immediate loading (2002-2025).*

Posterior blade implants

As much as in the anterior sector of the maxilla, blade implants can be indicated for the posterior sector of both jaws. This need often arises when the ridge is thin, due to reabsorption consequent to tooth extractions, which leads to loss of volume on the buccal side. Typically, the blade represents the posterior pillar of a prosthesis supported by multiple implants (7). To achieve immediate stability, bicortical fixation is suggested. In the inferior posterior jaw, the apical contact in the posterior sector is reached on the cortex of the mylohyoid line. In the superior posterior ridge, the maxillary and sinus cortex are important elements of bicortical stabilisation (8).

Posterior single-blade implants

Many times, when a molar has been lost, the bone heals, losing a part of the buccal volume (9). In these situations, a single-blade implant is suitable for providing a long-lasting solution with minimal surgical effort. In the upper jaw, the premolar area is often the right site for a single-blade implant (Fig. 2-5).

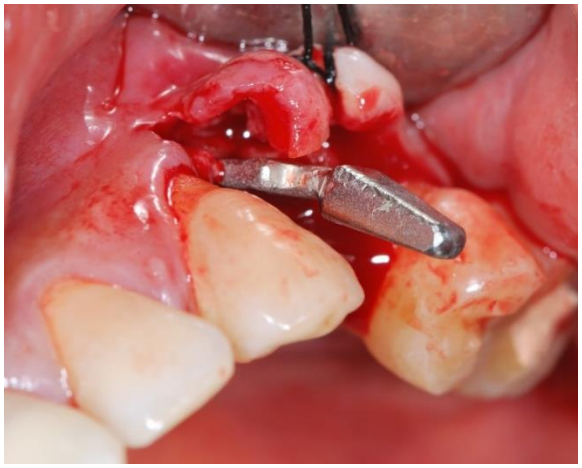

Fig. 2. *The abutment of a single-blade implant intended to be inserted in 2.4 was bent to obtain the correct position relative to the direction of the implant (December 18, 2023).*

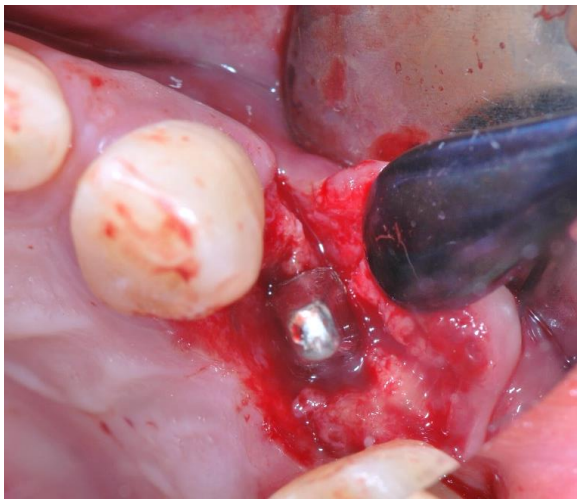

Fig. 3. *The implant abutment has been bent before inserting the blade implant inside a very thin bony ridge (December 18, 2023).*

Fig. 4. *Soft tissue healing around the blade implant abutment inserted on 2.4; (May 6, 2024).*

Fig. 5. *Definitive prosthetic crown cemented to the blade implant abutment inserted in 2.4 (May 6, 2024).*

Single-blade implants in the posterior areas of the jaws – Surgery

The execution of a single-blade implant in the posterior areas of the jaws requires the same procedures as blade implants intended to serve as abutments in a prosthetic bridge. The blade implant has a wedge shape, and its maximum thickness does not exceed 1.8 mm at the neck level (Fig. 6). After opening the flaps, small 1 mm wide holes are made along the superficial cortex with a 0.9 mm wide metal burr, then joined together to build a slot of the same mesio-distal size as the implant shoulder. The burr is then brought deep to accurately trace the deep part of the slot, and the implant is inserted inside until its abutment reaches the opening of the slot, resting on it. If the implant is not in the ideal direction, its abutment can be bent before the final insertion of the implant (10, 11). The shoulders of the single-blades are not extended in the mesio-distal direction, measuring only 5-6 mm in width; however, they are quite long in depth, allowing them to reach the deep cortical bone and achieve immediate stability. A long turbine burr is therefore necessary to allow for delicate work in depth. The blade implant is then gently tapped into the slot by hammering on a special positioning instrument till the implant abutment reaches its correct position, i.e., lying on the slot opening. In the posterior area, an automatic hammer is often recommended to facilitate inward percussion (12).

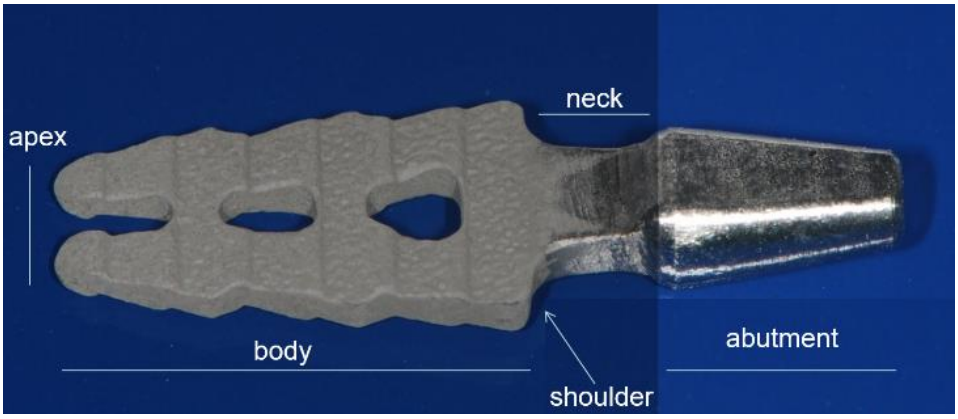

Fig. 6. *Blade implant anatomy. The blade implant should enter the bone till the abutment basis.*

Clinical Case

A 43-year-old Caucasian female patient presented to Dr. Dal Carlo in 2005 to replace the missing roots of three molars: 3.6, 2.6, and 4.6. In the area of 3.6, the ridge was thin; therefore, to take advantage of the patient's remaining native bone, the insertion of a blade implant was considered the best choice. After opening the flaps, a slot was drawn on the bone surface between teeth 3.5 and 3.7. A blade implant (A-Z Implant, Bologna, Italy) was then inserted in the correct position. A temporary prosthetic crown was immediately applied. After 4-5 months, a definitive prosthetic crown was then constructed and cemented to the implant abutment. After 20 years, the implant-prosthesis continues to function efficiently. Radiographs show a healthy situation (fig. 7-13).

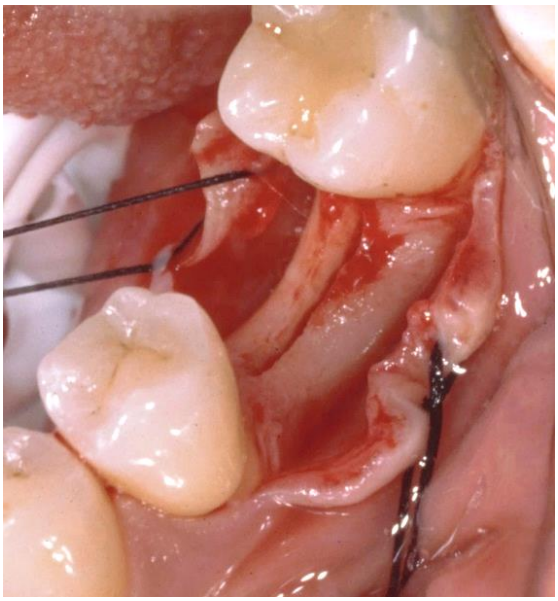

Fig. 7. *The slot drawn on the bone surface (June 21, 2005).*

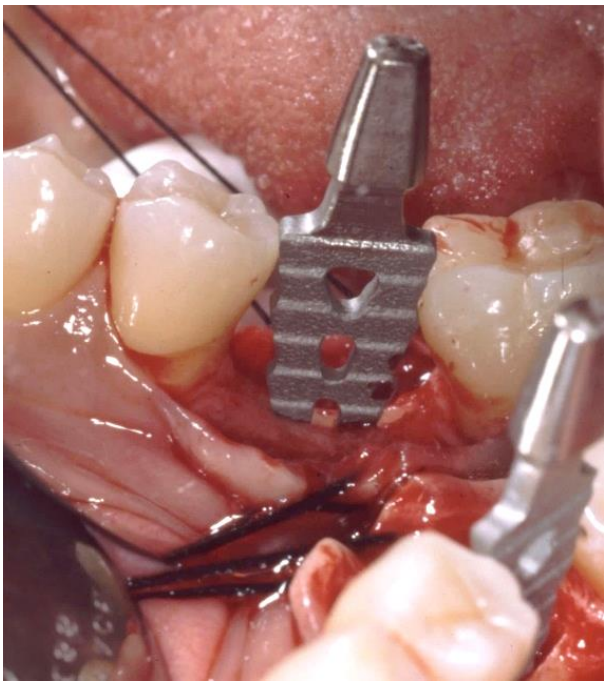

Fig. 8. *The blade implant during its descent (June 21, 2005).*

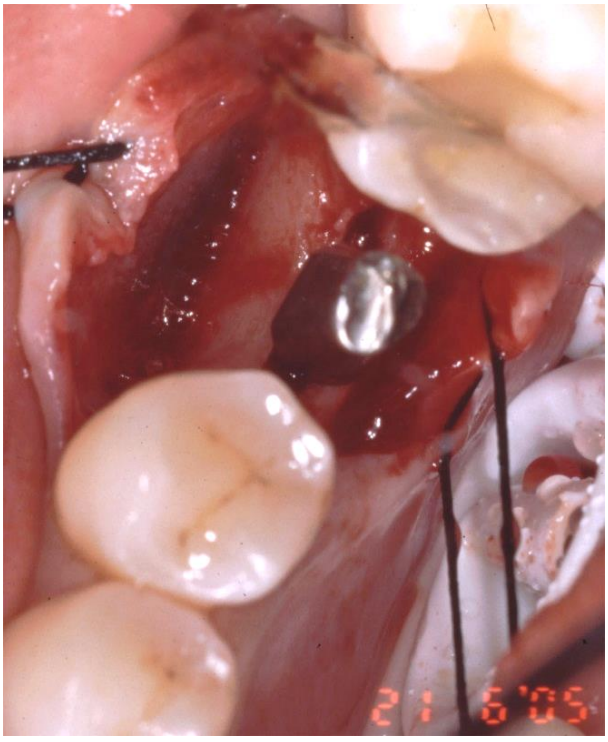

Fig. 9. *The blade implant in its final position (June 21, 2005).*

Fig. 10. *The immediate temporary prosthetic crown (June 21, 2005).*

Fig. 11. *The blade implant abutment ready for the definitive crown (Nov. 10, 2005).*

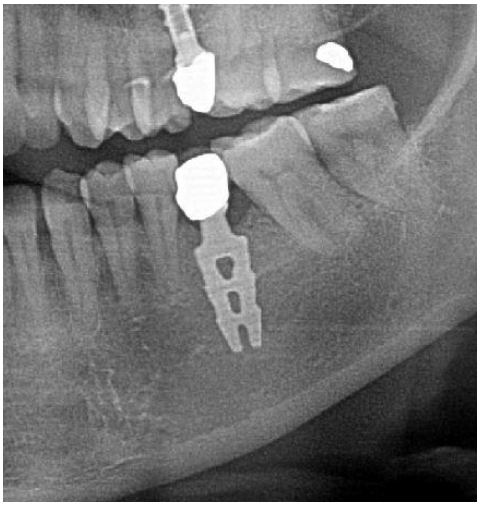

Fig. 12. *Opt taken 18 years later (May 5, 2023).*

Fig. 13. *Picture of the prosthetic crown after 20 years (Feb. 24, 2025).*

Technique

The procedures applied to insert a blade implant in the posterior sector are the following:

1. local anaesthesia;
2. performing a sagittal incision at the centre of the adherent gingiva;
3. by means of a periosteal elevator, opening lingual and buccal flaps;
4. performing little 1mm wide holes on the cortex surface;
5. connecting the little holes to open a slot;
6. deepening the slot by means of a 30 mm long/1.2 mm wide metal burr;
7. inserting the implant inside the slot for some millimetres, to check the direction;
8. performing an X-ray with the implant partially inserted to check the space in depth;
9. modifying implant abutment direction, if needed;
10. modifying implant apex, if needed;
11. inserting the implant till the abutment engages the slot;
12. performing the sutures around the abutment;

Flapless approaches are to be avoided (13).

Single-blades in the posterior inferior sector – ten clinical cases

The indication for the use of a blade implant in the lower posterior sector derives from the analysis of the morphology of the bone crest and the position of the adjacent teeth. If the bone crest is thin, there is support on the mylohyoid line, and the mesio-distal dimension is small, normally consequent to the mesio-inclination of the posterior tooth, this is the case of a long-term single-blade implant-prosthesis.

Since 2005, this technique has been used in Dr. Dal Carlo's dental office, where it has been applied to 10 clinical cases, all of which are now in perfect condition. Six female and four male patients were operated on, with an average age of 51. Three blade implants were inserted in the area of the 1st premolar, six in the area of the 1st molar, and one in the area of the 2nd molar. Due to the presence of the dental foramen, the area of the 2nd molar was avoided (Table I).

Table I. *Clinical cases of posterior single-blade implants with immediate loading and long-term functional success.*

N.	Initials	Gender	Age	Zone	Intervention date
1	CM	Female	43	3.6	2005, June 21
2	DR	Female	37	3.6	2005, Dec. 12
3	SM	Female	48	3.6	2006, May 23
4	BC	Female	49	3.4	2006, Sept. 29
5	SE	Female	75	4.7	2013, June 24
6	GM	Male	52	3.4	2021, Jan. 19
7	CR	Male	58	3.4	2021, Mar. 21
8	LE	Female	71	4.6	2022, Jan. 18
9	HY	Male	25	4.6	2024, Dec. 13
10	ZF	Male	61	4.6	2025, Mar. 11

DISCUSSION

Rehabilitation of the posterior sectors of the jaws with implants has several indications and numerous conditioning variables. The buccal-lingual dimension of the ridge is one of them. When the crest is thin, the use of a flat implant allows the native bone to be utilized, thus avoiding the need for regeneration interventions. The wedge implant, invented by Leonard I. Linkow, is perfectly suited to this purpose because its shape allows for penetration into the spongy bone, arresting its descent when it meets the bone cortex, which provides immediate stability. If the insertion procedure is performed correctly, the implant benefits from double stabilization: a) at the apex, on the deep cortex; b) on the superficial cortex, with entry of the abutment into the grafting slot. This double stabilization allows immediate loading with a prosthetic crown.

From a periodontal point of view, it is mandatory to make an incision in the gingiva halfway along the attached gingiva to ensure an adequate thickness of sealing of the keratinized soft tissues around the implant abutment. The monobloc blades optimize bone preservation, thus avoiding connection-related complications (14). Compared to alternative surgical solutions, such as bone regeneration to increase bone thickness and insert a screw implant, this solution is lighter, more reliable, and, therefore, more comfortable for the patients, increasing their compliance.

CONCLUSIONS

The use of single-blade implant prostheses to restore missing teeth in the posterior sectors is indicated when the bone crest is thin and the mesio-distal space is reduced to the size of a premolar. Some clinical cases are cited. A clinical case, documented after 20 years in optimal conditions, is presented. Due to its simplicity and lightness, this technique should be encouraged when correct indications are there. As with any implant rehabilitation, adequate surgery and prosthetic rehabilitation are mandatory to obtain lasting success rates.

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