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Immediate Full-Arch Corticobasal® Implant Rehabilitation in a Poorly Controlled Type 2 Diabetic Patient with Posterior Maxillary Atrophy: A Clinico-Radiological Case Report

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Abstract

Background: The coexistence of poorly controlled type 2 diabetes mellitus and advanced posterior maxillary atrophy presents compounded systemic and anatomical challenges in implant rehabilitation. While diabetes has historically been regarded as a relative contraindication to implant therapy, contemporary evidence suggests that metabolic control, rather than diagnosis alone, determines peri-implant prognosis. Similarly, advanced posterior maxillary resorption frequently necessitates alternative anchorage strategies.

Case Presentation: A 70-year-old male with HbA1c of 9.5% and generalized terminal dentition presented with functional impairment and reduced vertical dimension. Panoramic radiography demonstrated Cawood and Howell Class V-VI posterior maxillary atrophy with sinus pneumatization. After short-term perioperative insulin optimization, full-mouth extraction and placement of 20 Corticobasal® implants engaging pterygoid, nasal floor, and inferior mandibular cortical bone were performed. All implants achieved insertion torque >60 Ncm and were immediately loaded using a rigid cross-arch splinted prosthesis.

Results: Clinical and radiographic follow-up one year post-surgery demonstrated stable marginal bone levels and absence of peri-implant pathology.

Conclusion: When systemic optimization and strict biomechanical principles are integrated, immediate full-arch Corticobasal® rehabilitation may be feasible even in high-risk anatomical and metabolic scenarios. Long-term prospective studies are warranted.

Keywords: Corticobasal® implants; immediate functional loading; atrophic maxilla; uncontrolled diabetes; cement-retained prosthesis; Corticobasal® implantology; full-arch rehabilitation

Introduction

The management of terminal dentition in patients with poorly controlled diabetes mellitus and advanced posterior maxillary atrophy represents a complex intersection of systemic inflammatory dysregulation and biomechanical limitation. Diabetes mellitus has traditionally been regarded as a relative contraindication to therapy with Standard Osseointegrated Implants (SOI) due to concerns regarding delayed wound healing, impaired osseointegration, and increased susceptibility to peri-implant disease[1-3]. However, longitudinal clinical studies now demonstrate that implant survival rates in controlled diabetic patients approach those observed in non-diabetic cohorts[4-6]. The degree of metabolic control, commonly assessed through glycated hemoglobin (HbA1c), appears to be the principal determinant of complication risk rather than the diagnosis itself[4,6].
Oates et al. demonstrated that elevated HbA1c levels correlate with delayed implant stabilization and increased marginal bone changes during early healing[4]. Similarly, Monje et al. reported higher peri-implantitis prevalence among poorly controlled diabetics compared to normoglycemic individuals[2]. Nevertheless, systematic reviews indicate that survival rates frequently exceed 90% in well-controlled diabetic populations[5,6]. These findings suggest that diabetes should be regarded as a modifiable perioperative variable rather than an absolute exclusion criterion. Simultaneously, posterior maxillary atrophy presents an independent anatomical constraint. Progressive alveolar resorption combined with sinus pneumatization reduces vertical bone height, often rendering conventional crestal implant placement impractical. Cawood and Howell Class V-VI morphology represents advanced resorption with diminished vertical and horizontal ridge dimensions[7].

In addition to reduced residual ridge height, the posterior maxilla frequently exhibits low-density trabecular bone (Type III-IV), which compromises mechanical interlock and reduces primary stability – factors that are particularly critical when immediate loading is planned[8,9]. Classic clinical analyses have shown that implants placed in Type IV bone demonstrate higher early failure rates, underscoring the biological-mechanical vulnerability of this region[8].

Furthermore, post-extraction maxillary sinus pneumatization is a predictable phenomenon that further diminishes vertical bone availability in the posterior maxilla, aggravating the limitation for conventional crestal anchorage[9]. Consequently, techniques that deliberately bypass the pneumatized sinus and seek stabilization in remote, denser cortical structures (e.g., pterygoid / pyramidal process, nasal floor, and other basal cortices) have been described to improve primary stability and facilitate immediate or early function in severely resorbed cases[11].

Corticobasal® implants represent a biomechanically distinct approach, prioritizing engagement of dense cortical bone rather than relying predominantly on trabecular alveolar remodeling[13]. Remote cortical anchorage zones such as the pterygoid plate, nasal floor, and inferior mandibular cortex provide high-density bone suitable for immediate loading when sufficient primary stability is achieved[13,14].

The present report describes the complete clinical, surgical, prosthetic, and radiographic management of a 70-year-old male with poorly controlled type 2 diabetes (HbA1c 9.5%), chronic tobacco exposure, and advanced posterior maxillary atrophy rehabilitated using immediately placed (post extraction) Corticobasal® implants. Beyond technical description, this report synthesizes comparative literature to contextualize decision-making in compounded risk scenarios.

Case Presentation

A 70-year-old male presented with progressive masticatory dysfunction, generalized mobility of teeth, dissatisfaction with esthetics, and reduction in lower facial height. He reported inability to chew fibrous foods and reliance on a soft diet. He requested fixed rehabilitation and declined removable prosthetic solutions.

Extraoral examination revealed diminished lower facial height with perioral collapse, consistent with loss of posterior occlusal support. Facial symmetry was preserved and temporomandibular function was within normal limits. Intraoral examination demonstrated generalized severe chronic periodontitis. There was extensive clinical attachment loss, gingival recession, grade II-III mobility in multiple teeth, furcation involvement in posterior segments, and irregular occlusal plane secondary to pathologic migration. Heavy staining from chronic tobacco smoking and betel nut chewing was evident. Several teeth were structurally compromised and deemed non-restorable (Figure 1).

Preoperative panoramic radiography demonstrated advanced horizontal and vertical alveolar bone loss in both arches. The posterior maxilla exhibited progressive resorption and pronounced sinus pneumatization, with insufficient residual bone height for conventional posterior crestal implants. The anterior maxilla demonstrated cortical thinning but retained sufficient vertical dimension for cortical engagement. The mandibular posterior region exhibited vertical bone loss; however, the inferior cortical border remained intact. Based on radiographic morphology, the maxillary ridge corresponded to Cawood and Howell Class V-VI[7] (Figure 2).

Medical history revealed type 2 diabetes mellitus with HbA1c of 9.5%, indicating poor glycemic control. No cardiovascular or renal comorbidities were reported. Given elevated HbA1c, surgical intervention was deferred. Insulin therapy was initiated one week prior to surgery in coordination with the patient's physician. Fasting blood glucose levels were reduced to approximately 145 mg/dL before surgery. Postoperatively, HbA1c improved to 6.5% within two months.

***Fig. 1**: Preoperative examination of the patient; **A**. Extraoral examination, **B**. Intraoral examination*

***Fig. 2**: Preoperative panoramic radiograph (OPG) demonstrating generalized progressive periodontal bone loss with advanced posterior maxillary ridge resorption and maxillary sinus pneumatization.*

All procedures were performed under strict aseptic conditions following perioperative antibiotic prophylaxis. Intravenous amoxicillin–clavulanate (1g) was administered prior to incision and continued postoperatively for five days. The patient was treated under local anesthesia using bilateral infraorbital, posterior superior alveolar, inferior alveolar, and long buccal nerve blocks with supplemental local infiltration to ensure profound anesthesia. Full-mouth extraction was performed atraumatically using periotomes and controlled luxation techniques in order to preserve residual cortical structures (Figure 3A). Particular care was taken to avoid excessive buccal plate fracture, especially in the severely resorbed posterior maxilla. Following extraction, thorough socket debridement was carried out to remove granulation tissue and inflammatory debris. A full-thickness mucoperiosteal flap was elevated in both arches to allow direct visualization of the alveolar crest and anatomy. Given the irregular crest morphology and areas of sharp residual bone, ridge regularization (bone reduction) was performed using rotary instrumentation under copious sterile saline irrigation. This step was critical to establish a uniform platform for implant insertion and to eliminate unsupported crestal projections that could compromise implant angulation.

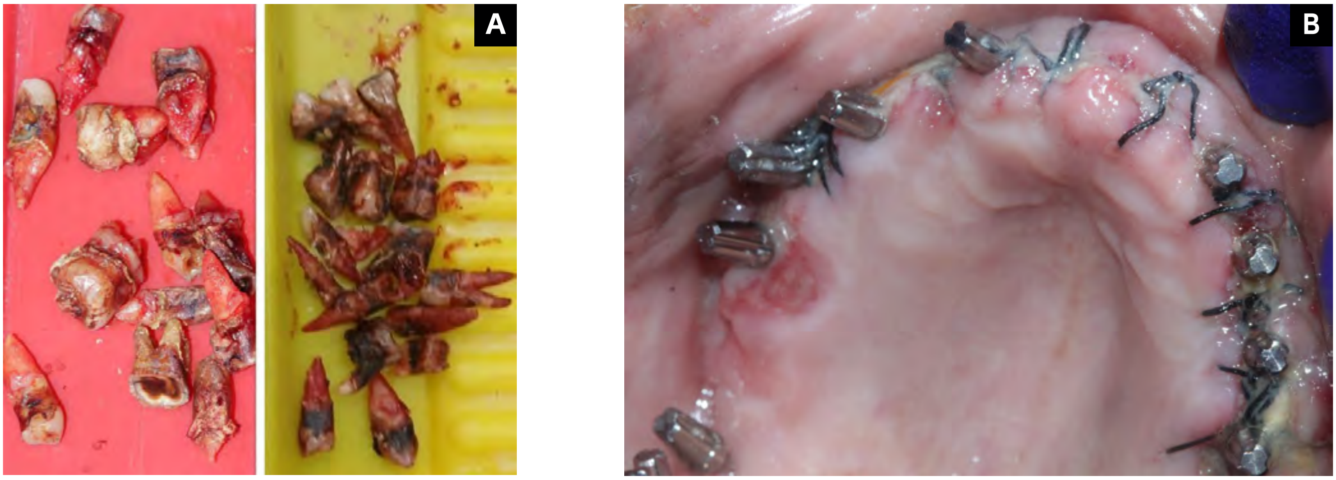

***Fig. 3**: Surgical procedure. **A**. Full set of extracted maxillary and mandibular teeth; **B**. Immediate postoperative occlusal view of the maxilla demonstrating multiple Corticobasal® BECES® Simpladent® GmbH implants with angulated posterior pterygoid engagement and primary closure with interrupted sutures.*

In the maxilla, osteotomies were initiated using pilot drills under copious irrigation. Given the limited crestal bone height posteriorly, the surgical plan emphasized engagement of remote cortical anchorage zones. Posterior implants were deliberately angulated in a posterior-superior direction toward the pterygoid process. The osteotomy trajectory was extended beyond the sinus floor without sinus membrane elevation, targeting the dense cortical bone of the pterygoid plate. Careful tactile feedback during drilling and insertion was used to confirm engagement of high-density cortical bone. A total of eleven BECES® implants (3.6 mm diameter; 17-26 mm length). (Manufacturer: Simpladent® GmbH, Dorfplatz 11, 8737 Gommiswald / Switzerland) were inserted. Final implant insertion was performed using a hand ratchet to monitor resistance, achieving insertion torque values exceeding 60 Ncm (Figure 3B). Meredith[15] demonstrated that higher insertion torque correlates with improved primary stability and reduced micro motion. Experimental data suggest that micro motion exceeding approximately 100 µm may impair osseointegration[16]. Anterior maxillary implants were oriented superiorly toward the nasal floor cortex. Bicortical stabilization was achieved by penetrating the crestal cortical plate and engaging the nasal cortical floor. Depth and angulation were controlled to avoid that implant bodies were touching while stable anchorage was achieved in the cortical of the base of the nose.

Implant distribution and position as well as target corticals were planned according to the 6th Consensus Document of the International Implant Foundation IF® ("16 Methods Consensus Document"), Munich / Germany, see www.implantfoundation.org) to maximize anteroposterior spread and eliminate distal cantilever requirements. The angulation of posterior implants allowed prosthetic support to extend distally without sinus grafting.

In the mandible, nine BECES® Simpladent® GmbH implants were placed engaging both crestal cortical bone and inferior mandibular cortex, achieving bicortical fixation. Osteotomies were prepared to engage both the crestal cortical plate and the inferior mandibular cortex. Controlled drilling depth and angulation ensured cortical engagement (and penetration) in order to create real anchorage against intrusive and extrusive forces. Insertion torque values in the mandible exceeded 60 Ncm, confirming strong primary mechanical interlock. The tactile increase in resistance upon engaging inferior cortical bone provided intraoperative confirmation of bicortical fixation.

After placement, all implants were manually tested and sound-checked for stability. No implant demonstrated rotational mobility. Parallelism and prosthetic alignment were assessed clinically to facilitate cross-arch splinting. The surgical field was thoroughly irrigated and cleaned with Povodin-Iodine 5% solution. Flaps were repositioned and sutured using interrupted resorbable sutures without tension. Hemostasis was achieved without complication. Total surgical duration was approximately 2.5 hours incl. impression taking. No intraoperative complications such as sinus membrane perforation, excessive bleeding, or cortical fracture were encountered.

Immediate functional loading was initiated within 48-72 hours following implant placement, based on uniformly high primary stability with insertion torque values exceeding 60 Ncm and absence of rotational mobility. A closed-tray impression was made using addition silicone to accurately transfer implant positions, and a rigid metal-reinforced cement retained porcelain-fused-to-metal full-arch prosthesis was fabricated with emphasis on active fit (not screw retained passive prosthesis) (Figures 4 and 5). The achieved anteroposterior spread allowed elimination of distal cantilevers, thereby reducing bending moments and non-axial stress concentration. Prosthesis adaptation was verified clinically prior to definitive cementation as a cement-retained active prosthesis. Occlusion was adjusted to establish evenly distributed centric contacts with minimized lateral interferences to reduce functional loading during early healing. The patient was instructed to maintain a soft diet and strict glycemic control. Serial follow-up demonstrated stable prosthetic integration and absence of peri-implant complications at one year.

***Fig. 4**: Immediate post-loading intraoral frontal view demonstrating full-arch implant supported prosthetic rehabilitation with restored vertical dimension and bilateral occlusal stability.*

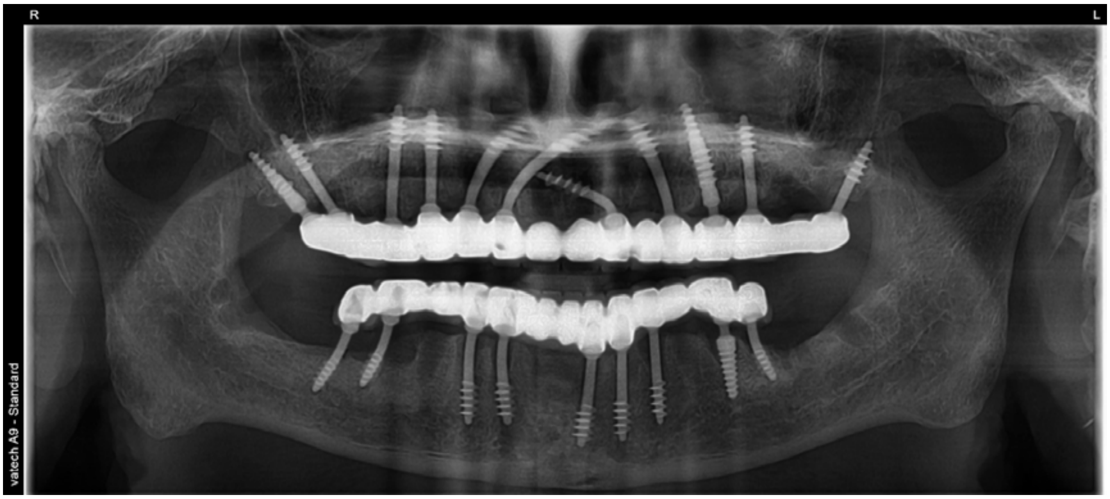

***Fig. 5**: Immediate postoperative panoramic radiograph demonstrating full-arch Corticobasal® BECES® implant placement with posterior pterygoid anchorage, anterior nasal floor engagement, and mandibular bicortical stabilization.*

Postoperative healing and prosthesis functioning was uneventful. The patient was recalled at one month, three months, and every six months thereafter; definitive follow-up was done at one year, with no signs of infection, mobility, or prosthetic instability. Radiographic evaluation demonstrated stable marginal bone levels and absence of peri-implant radiolucency.

Discussion

Diabetes and Implant Survival

Implant survival in diabetic populations has been extensively studied. Moy et al. reported increased failure rates among diabetics compared with non-diabetics; however, glycemic control was not stratified[17]. Subsequent studies clarified that controlled diabetic patients demonstrate survival rates comparable to normoglycemic individuals[4-6]. Oates et al. observed delayed early stabilization in poorly controlled diabetics, but survival rates remained high when perioperative management was optimized[4]. Systematic reviews indicate survival rates of 88-97% in diabetic populations depending on metabolic control[2,6]. Monje et al. identified increased peri-implantitis prevalence among poorly controlled diabetics[2]. These findings reinforce the importance of glycemic optimization prior to surgery. In the present case, surgery was intentionally delayed until fasting glucose levels were reduced. Although long-standing metabolic effects cannot be reversed immediately, early inflammatory amplification during the critical healing phase was likely attenuated.

Posterior Maxillary Atrophy and Cortical Anchorage

In contrast, pterygoid implants engage the pyramidal process of the palatine bone and pterygoid plate, offering dense cortical support[13,18]. Aparicio et al. reported favorable survival rates for pterygoid implants in atrophic maxilla[18]. Engagement of nasal floor cortex anteriorly further enhances bicortical stabilization.

Immediate Loading and Biomechanics

Immediate loading protocols have demonstrated survival rates comparable to delayed loading when primary stability is achieved[19,20]. Esposito et al. reported no significant difference between immediate and conventional loading in systematic review[20].

Primary stability remains critical. Meredith emphasized insertion torque as a predictor of stability[15]. Glauser et al. demonstrated that high torque values correlate with successful immediate loading[19]. Cross-arch splinting distributes occlusal forces and reduces micro motion.

In this case, insertion torque exceeded 60 Ncm in all implants, providing a substantial mechanical safety margin. Elimination of distal cantilevers reduced bending moments, as supported by biomechanical analyses[21].

On the other hand, contacts between the upper and lower anterior group of teeth during occlusion and mastication can have disastrous effects, because they might create extrusive forces on the distal implants.

Smoking Interaction

Smoking has been associated with increased implant failure and marginal bone loss[22]. Bain and Moy reported higher failure rates in smokers[22]. However, the magnitude of risk is influenced by implant distribution, loading protocol, and maintenance. In this patient, rigid splinting and cortical anchorage likely mitigated early failure risk.

Additionally, the coexistence of chronic tobacco exposure and hyperglycemia represents a compounded risk model characterized by impaired vascular perfusion and increased inflammatory burden. However, implant survival is multifactorial. In the present case, the mechanical determinants of success, namely high insertion torque, bicortical stabilization, elimination of cantilevers, and rigid cross-arch splinting, have likely reduced micro motion below critical thresholds. Mechanical stability may therefore partially offset moderate biological compromise when systemic parameters are concurrently optimized.

The significance of the present case does not lie in the isolated application of Corticobasal® implants or immediate loading alone, both of which are established techniques, but in the deliberate integration of these strategies within a compounded high-risk context. The coexistence of uncontrolled diabetes (HbA1c 9.5%), chronic tobacco exposure, and Cawood and Howell Class V-VI posterior maxillary atrophy represents an intersection of systemic inflammatory risk and advanced biomechanical limitation.

Reports documenting immediate full-arch rehabilitation under such combined conditions remain limited. The present case therefore provides a clinically relevant demonstration of risk-stratified decision-making rather than procedural novelty alone. The principal limitation is the single-case design and one-year follow-up. Long-term data are necessary to confirm durability. Nonetheless, early failures in immediate loading typically occur within the first months if primary stability is inadequate[16].

While in the field of “osseointegration” a large number of factors are deemed to influence SOI success, this belief has not spread in the field of oral osseofixation as well as in traumatology in general.

Table 1 shows the large differences regarding contra-indications between SOI and Corticobasal® implants. As both types of implants are made on the same machines and from the same material, we can conclude that most of the contra-indications for SOI are freely invented, and they are used to mask the fact that in the field of SOI, by far too many implants fail and this requires an explanation, which will shift the blame to the patients.

Regarding the effects of diabetes on the human body in general, bone or jawbones are clearly not affected.

Comparison of “Contraindications” between Standard Osseointegrated Implants (SOI) and Corticobasal® Implants (CBI®)

Reasons That Dentists / Conventional Implantologist Tell Patients to Explain Why a Conventional Implant Has Failed - Combinations of „Reasons“ to Justify the Failure Are Possible and Likely	Assumed / Possible Reasons for Loss of a Strategic Implant® / CBI® / Corticobasal® Implant
1. Pre-existing infection in the bone 2. Infection in the bone, carried in during the implant surgery (through saliva or non-clean drills) 3. Too much insertion torque 4. Not enough insertion torque 5. Allergies against implant material 6. Idiopathic loss of implant 7. Rough implant surface (leading to peri-implantitis) 8. Polished implant surface (which allegedly does not integrate) 9. Use / abuse of alcohol 10. Smoking (of anyone) 11. Various general diseases 12. Surgery done (treatment started) in wrong moon-phase 13. Wrong implant brand used 14. Over-heating of bone during surgery 15. Parafunctions / bruxing 16. Forces have acted through gingiva onto the implants during healing time 17. The „age“ in general (patient’s age, Dr’s age?) 18. „Bad bone“	1. Missing anchorage in the 2nd or 3rd cortical (surgical mistake, under control of the treatment provider) 2. Overload osteolysis around the load-transmitting threads (prosthetic mistake; mistake in planning; planes wrong, not enough or wrong contacts, unilateral chewing pattern, anterior chewing pattern; all factors being under control of the treatment provider) 3. Retrograde osteolysis (inocculation of debris while implants are being screwed in; this factor is also reasonably under control of the treatment provider) 4. Change of spatial position of 2nd corticals 5. Missing or wrong clinical control (patient misses to fulfill his obligations) 6. External factors (treatment done on non-treated jaw (by other Drs.) resulting in a loss of balanced loading), extractions, affecting the bilateral chewing possibilities

Continued: Comparison of "Contraindications" between Standard Osseo-integrated Implants (SOI) and Corticobasal® Implants (CBI®)

Reasons That Dentists / Conventional Implantologist Tell Patients to Explain Why a Conventional Implant Has Failed - Combinations of „Reasons" to Justify the Failure Are Possible and Likely	Assumed / Possible Reasons for Loss of a Strategic Implant® / CBI® / Corticobasal® Implant
19. Low vitamin D level (too short summer holidays with no sun) 20. Peri-implantitis 21. Titanium ion leaks (out of the implant`s surface into the bone) 22. Bacterial leaks out of implant abutment connections 23. Genetic reasons (provided by patient) 24. Immune system activation 25. Missing implant control (through treatment provider) 26. Too many osteoclasts (compared to osteoblasts) 27. Titanium wear between mobile parts of the implants 28. „Bacteria" 29. Too high forces / adverse loading 30. Use of anti-depressants (may lead to underloading)* 31. Use of "wrong types of sutures"* 32. Claustrophobia* 33. Allergies against particles that came off the drills* 34. Thrombozyte alterations*	

* Periodontology 2000 (Journal No. 83)

***Table 1**: Shows large differences in medical "contra-indications" (i.e. reasons for loss and failure) between SOI and CBI®. All contra-indications for SOI as displayed here were taken from literature, and all of them do not apply for CBI® (allthough both types of implants are made form the same material on the same machines).*

Most "contraindications" on the left side of the table are freely invented to allow the implantologist to put the blame on the patients if osseointegrated implants fail.
The failure rate in osseointegrated implants is so high that such measures must be taken by their users (implantologists) and the implant manufacturers to get at least some protection from patient claims.

Conclusion

Immediate full-arch rehabilitation was successfully achieved in a patient with poorly controlled type 2 diabetes and advanced posterior maxillary atrophy following short-term metabolic optimization. Engagement of dense cortical anchorage zones, high primary stability, elimination of cantilevers, and rigid cross-arch splinting enabled immediate functional loading. One-year outcomes were favorable; however, long-term prospective validation is required.

Comments on Ethics Approval

The patient signed informed consent forms prior to the treatment. The patient also consented to the use his images for academic / research purposes including the publication in this article. Ethics approval in general can be waved, if standard reports about cases, case series and cohorts are taken from daily routine practice anonymously.

Conflict of Interest Statement

The author declared no conflicts of interest related to this case report.

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