Indications and treatment modalities with Corticobasal® jaw implants

(Ver 1: September 2019)

Definition of Corticobasal® implantology:
Corticobasal® implantology is a method/technology using Corticobasal® implants, in order to establish a Bone-Implant-Prosthetic-System (BIPS).

Definition of Corticobasal® implants[1]:
Corticobasal® implants are implants which are osseofixated in cortical bone areas with the intention to use them in an immediate loading protocol. The "Consensus on Basal Implants" (2018) of the International Implant Foundation applies to such Corticobasal® implants.

Concept of the technology of the Strategic Implant®:
From technical point of view, the concept of treatment associated with the Strategic Implant® (Corticobasal® implantology) is identical to the concept of treatments performed during osteosynthesis, maxillofacial traumatology and orthopaedic surgery. In contrast to conventional dental implants which are inserted in order to "osseointegrate", Corticobasal® implants are osseofixated in at least one cortical by the surgeon; their success does not depend on any subsequent "osseointegration". However "osseointegration" may and will occur over time along all endosseous implant parts, as the implant contains very large amounts of titanium. Due to the major differences between the osseo-integration procedure and the osseofixation procedure, we cannot expect the rules, indications and contraindications of conventional dental implantology are applicable to the treatment with Corticobasal® implants. It is more logical to adapt the rules of traumatology and orthopaedic surgery to the field of Corticobasal® dental implantology. Once this is done, new and very clear and logical rules and guidelines become evident and they should be applied with these types of implants.

The present consensus document describes the use of Corticobasal® implants which can be considered highly superior and more effective than the technique of "osseointegrated" conventional dental implants. It also describes different aspects associated with this treatment modality including the situations in which special care is required or where the implant treatment plan must be adjusted.

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1. Classification of endosseous implants

Implants used in the bone can be assigned under one of two main groups that exhibit fundamental differences:

Table 1

Classification of implants use in human bone

Type of Fixation Fields of application	Implants to be stabilised by osseo-integration with or without immediate loading (conventional dental implants)	Implants to be stabilised by osseofixation and for immediate loading
Non-dental medical fields	n/a	Trauma devices; orthopaedic implants; fracture plates and screws; some implants for joint replacement (all designed for use within or on the human bone)
Dental field	Conventional two-stage-implants; two-piece-implants; blade implants; one-piece compression-screw implants (designed to compress spongious bone areas) designed for use in the human jawbone. One-piece or two-stage compression-screw implants, designed for initial stabilisation by compressing spongious bone areas and subsequent osseointegration.	One-piece or two-piece implants for cortico-basal osseofixation

Classification of implants use in human bone, with comparisons to devices used in trauma and orthopaedic surgery. This comparison refers to the surgical steps of the treatment as well as to corrective interventions with the aim of re-establishing stable cortical anchorage.

Note:

When looking at the Corticobasal® zygomatic implants (according to IF method 12) and the glabella support newly introduced into the profession (currently not yet an IF method), it becomes clear that it is not even possible to draw a line between these dental implants and maxilla-facial trauma devices.

2. Definition of the word "(Implant-) System" if used for conventional dental implants and for the category of Corticobasal® implants:

The term "implant system" in conventional implantology refers to the different parts of dental implant produced by the same manufacturer or different manufactures but they are generally compatible with each other. When comparing the implant system described in conventional implantology with the implant system utilized in Corticobasal® implantology fundamental differences were observed which are described in

Table 2.

Revised definition of the term "Implant System"

"Systems" in conventional dental implantology	Bone-implant-prosthetic-system (BIPS) for Corticobasal® implants
The term "implant system" refers to the parts of dental implant systems produced by the same manufacturer or generally compatible with each other. An implant system consists of implants, tools, abutments, accessory screws, laboratory parts and adjunct parts, as well as prosthetic screws for temporary and permanent construction and healing abutments.	The conceptual background of Corticobasal® implantology the refers to the bone/implant/prosthetic system (BIPS) as a single entity. One or multiple BIPS can be created in each jaw. The relative motions of the jawbones are guided by masticatory slopes and these slopes are a part of each BIPS. The relative position of the mandible in joint centric is determined by occlusal stops. Joint centric and occlusal centric must be reached simultaneously. Muscle forces must be arranged or kept adequate to facilitate safe long-term function of the BIPS. Single implants contribute to the functioning of the system, just as the prosthesis and the bone do. Each component of the system has its own task to fulfil. Implants are used to connect the second or third cortical to the occlusal and masticatory surfaces. In Corticobasal® implantology, "osseointegration" at or beneath the first cortical is neither important or not necessary for the functioning of the BIPS. The implantologist decides which corticals are most suitable for the creation of the individual BIPS and which should be the functional plan for every single implant in the BIPS. They also decide which component could be removed with or without replacement, if the need arises.

3. Medical contraindications of the osteosynthesis in comparison to the field of Corticobasal® implants and BIPS

When considering Corticobasal® (jaw) implants and their similarity to trauma-devices (in design, usage and regarding the therapy concept) and devices for orthopaedic surgery, it seems logical to follow the experiences and rules of traumatology regarding the indications and contra-indications.

"Osteosynthesis is contraindicated when it does not yield any advantages compared to the conservative therapy."

Applicability to the field of oral (dental) implantology:

The conservative treatment options used in edentulous patients are either leaving the patient edentulous or to insert removable denture.

Only very few young patients who received complete dentures will prefer wearing dentures over having fixed teeth on implants – and they are free to continue with this treat-

ment option. On the other hand, the majority of the adults in today's scenario will try to avoid dentures under all circumstances. According to the literature many patients are still dissatisfied with their removable denture regardless of the fact that most dentures are perfectly constructed and follow all the clinical steps.

It is understood today, and supported by scientific literature, that the treatment with Corticobasal® implants has many advantages over the conservative therapy used for treating edentulous patients such as dentures or leaving the patient (partially) edentulous.

"Osteosynthesis is contraindicated in patients presented with severely compromised medical condition and/or with a high surgical risk failure."

Applicability to our field:
If the patient has been diagnosed or reported as a medically compromised patient, consultation with the patient's physician should be done prior to the start of the implant treatment.

The medically compromised patients can be classified according to their conditions into: generalized or localized medical conditions.

Generalized medical conditions includes many conditions; such as:

Cardiologic conditions, oral cancers patients, radiation therapy, ongoing or recently finished chemotherapy (especially therapies which are directed to affected the bone, as in the case of bisphosphonates); permanent medication that influences the bone physiology or lowers the patient's resistance to infections.

Certain general medical conditions do not affect implant success per se, however the medical therapy of the condition may affect oral implant treatment or present a contraindication. A typical example of this condition is Crohn's disease. Since the related side effects are not present in all patients, the decision for or against treatment must be made on a case-to-case basis, and following the advice of the treating specialist.

Intravenous bisphosphonate therapy:
Bisphosphonates are chemotherapeutic agents acting on the bone. According to the current literature, this condition can present a risk to the mechanisms also of the Strategic Implant® (Corticobasal® implantology), and therefore it is recommended to exclude the affected patients from the implant treatment at least for some time after the last intravenous application. The half-life of these drugs is often more than 10 years. Therefore, treatment with any kind of dental implant should be postponed significantly. The presence of the drug within the jaw bones cannot be measured or estimated.

Unfortunately, nowadays bisphosphonate therapy is often prescribed for the treatment

of osteoporosis. An increasing percentage of the population today is "contaminated" with bisphosphonates. Orthopaedic surgeons who administer bisphosphonates to support bone surgery followed by incorporation of implants for joint replacement often do not consider the fact that dental implantology is performed in a septic environment and that infections can pre-exist in the bone or spread to the bone along the implant surface (e.g. cases of "natural"/ "physiological" bone loss or cases of periimplantitis). So, sites associated with implant penetration must be primarily considered, and treated as, open (bone and soft-tissue) wounds; even when polished implants are used.

"Special contraindications may exist in the presence of unfavourable conditions, such as ongoing tumour (cancer), diseases of the skin or the soft tissues, massive swellings (e.g. after trauma) or local disruption of arterial or venous blood flow (e.g. a compartment syndrome)."

Applicability to our field:
Implant therapy is contraindicated or postponed in cases where oral cancer has been diagnosed involving the intraoral soft and hard tissues or when soft-tissue areas have been destroyed or severely damaged. The priority is to treat the cancer/tumor and save the patient's life. It is ethical however to treat also terminally ill patients (on their wish) with dental implants and fixed prostheses, preferably with a minimally invasive technology and in an immediate loading protocol. In case of severe periodontitis, especially if massive and long-lasting nicotine abuse is reported, the condition is complicated. Heavy bleedings can occur intraoperatively. Such conditions can be treated successfully before oral implant treatment is carried out. Usually, the treatment is carried at the time of implant placement including the removal of the infected tissues and antibiotic application. Management of the affected soft tissues is important for a successful treatment outcome.

Conditions stemming from mechanical irritation such as ill-fitting prostheses, (mild denture hyperplasia, denture hyperkeratosis; deep mukosa infections stemming from the long-term use of denture glues), will tend to heal or subside once the mechanical irritation by the dentures is prohibited after implant-supported bridges are incorporated.

In single-arch cases– especially when full maxillary dentures have been replaced by a BIPS supported on Corticobasal® implants – patients may temporarily (up to weeks) experience pain arising from the hypertrophic soft tissues before it shrinks. Pain caused by hypertrophic soft tissues can also device from the contact with non-set cements, even if the cements are later removed. Cements may get disseminated into the folds of hypertrophic or hyperkeratinized soft tissues. Patients which report this type of pain should be motivated to increase their efforts to maintain a very good oral hygiene; regular intraoral disinfection is also recommended until the soft-tissue thickness and quality have normalized. This pain may be connected to changes in the blood-perfusion of the soft tissues under the dentures as well as to past irritations and changes in tissue quality created by the usage of denture glues.

General dental practitioners are typically unaware that (especially in the upper jaw) the removal of dentures without incorporation of a new removable soft tissue borne denture can cause, either by itself or in combination with minor penetration of the mucosa, prolonged pain and a comprehensive restructuring of the soft tissues, which may take weeks to "heal".

Patients with high chewing forces and bruxers seem to experience such transient pain more often. Long term use of denture adhesives before implant placement may aggravate this condition.

Interestingly, patients which preoperatively present with deep or even profoundly infected periodontal tissues do not experience this type of pain, as all the periodontally involved tissues are removed after extraction and before (simultaneous) implant placement.

"Osteoporosis can provide serious challenges to osteosynthesis. It may reduce or even prevent the stable fixation."

Applicability to our field:
Fortunately, osteoporosis hardly affects jawbones to the same extent as it does in the long bones, spine, etc. Spontaneous fractures of the mandible in severe cases of osteoporosis following placement of lateral basal implants have been reported. Such fractures typically occur six weeks postoperatively. This shows that the deterioration of the mechanical properties of the osteoporotic bone was caused by post-traumatic remodelling action of the bone and regular mechanical loading (with subsequent accumulation of microcracks) will contribute to the failure of the bone.

Fractures of the mandible after inserting the Strategic Implant® may occur in cases of severe atrophied residual alveolar ridge, if the caudal (basal) cortical of the distal mandible is fully penetrated by the drill (i.e., when **IF Methods 5a or 5b were not used**) or if the load-transmitting threads of the implants are too close or even touch. Localized or generalized prosthetic overload will increase the amount and extent of these cracking and propagate microcracks in these cases.

Recommendation:
When treating patients with osteoporosis, it is strongly recommended **not to penetrate the basal cortical of the (distal) mandible** with the drill for all implants. Instead, oblique implant insertion into the lingual and vestibular cortical is advisable **(IF Methods 5a, 5b).** Increasing the number of implants per jaw must be considered in order to utilize more cortical areas and to ensure better force distribution.

"Osteosynthesis may be contraindicated in cases of osteomyelitis."

Applicability to our field:
Osteomyelitis is defined as an infection of the bone tissue. While decorticalisation is the

surgical therapy used for osteomyelitis, the insertion of osteosynthesis plates, and screws might cause the disease to spread in bones. Decorticalisation triggers the formation of new corticals and often of plexiform bone or of other types of bone with a periosteal origin.

Pre-existing intrabony infections (i.e., infections inside the bone, but not of the bones) such as periapical granulation should be removed, and the site should be disinfected (with Betadine® 5% – 10%). The area that provides mechanical retention for the Corticobasal® implant extends beyond these areas deeply into the second or third cortex.

Recommendation:
Treatment of patients showing signs of osteomyelitis (active disease) should not be started. Any treatment with single-piece implants, even if done without flap, carries the risk of inoculating an infection into the bone, just as an open flap procedure does. Hence, necrotic bone areas may get superinfected through the implant slot.

Since non-resorbed augmented areas inside or adjacent to the bone must be considered as "non-vital" substances whose surfaces can be easily colonised by bacteria (just as osteomyelitic bone areals), placement of single-piece implants in these areas may result in colonisation of any material used for the augmentation and remain non-resorbed. We know, however, that no clinical problems will become evident in the vast majority of cases where some of the implants for the construction of a BIPS are placed in pre-augmented bone. Unfortunately some of the materials which are labelled "resorbable" by their manufacturer, *appear not to be resorbable in the clinical reality, or they may not resorb for various reasons in an individual patient case.*

Malformations of blood vessels in the jaws, such as aneurysms, are a contraindication also for the technology of the Strategic Implant®, even if the second cortex could be reached by the implant.

Recommendation:
Treatment under these conditions can provoke massive and unstoppable bleeding, and for this reason, the presenting condition must be treated first successfully.

Patient's medication and drug history:
It is not possible to give any clear-cut advices or guidelines when it comes to considering the patients medication given by other professionals in the medical field. Elderly patients often receive a number of different medications simultaneously. These drugs have typically not been clinically tested in the combination prescribed by the treating physician(s). Hence we cannot estimate if the given combination of drugs has influence on the treatment with Corticobasal® implants either.

Recommendation:
Multimorbid patients (who may take many different medications daily) must be informed

that their prognosis for dental implant treatment cannot be predicted and that they should be ready to expect surprise reactions and challenging situations.

Local medical / dental conditions that may influence the treatment include:

Pronounced masticatory and parafunctional forces, especially those related to the masseter muscle. This condition, if diagnosed, may requires a prophylactic reduction of the patients chewing forces, e.g., with the help of botulinum toxin. A correct implant treatment plan is mandatory for increasing the functional areas and ensuring better force distribution. In cases when the condition remains unnoticed until the cortically anchored implants have become mobile as a result of masticatory overload or bruxism, an immediate treatment should be attempt using botulinum toxin. Both prophylactic and therapeutic applications of botulinum toxin are done by its injection into the masseter muscle on both sides simultaneously. Treating the temporal muscle may also be considered in some cases. This therapy is usually associated with changes in the occlusal situation (i.e. the position of the mandible), which must be monitored and adjusted.

Unilateral and anterior chewing habits should be corrected during the prosthetic treatment after implant placement to ensure an equal distribution of the masticatory forces, prevent implant overload in the chewing side and disuse atrophy on the non-working-side.

If **extractions** are to be performed before or in combination with immediate implant placement, the indications and contraindications applied with extractions must be considered separately (see below).

Present acute infection of the maxillary sinus(es). This condition might require a treatment delay, a prophylactic surgical intervention by a surgical otolaryngologist is recommended in severe cases to ensure a more stable and patent airway passage into the maxillary sinuses, or the avoidance of the maxillary sinus by using IF Methods 6, 7A and 10 without penetration into the sinus (where applicable). But even if the sinuses appear ventilated or well ventilated on a preoperative CT scan, there is still no guarantee of permanent or sufficient air passage through the natural ostium after a surgical intervention affecting the floor of the sinus. It can be concluded from literature, that if polished implant tips penetrate into the sinus or trespass this does neither initiate sinus infections nor propagate or prolong such infections.

Applicability to our field:
The physician treating the patients' medical condition can provide valuable details about the patient's condition and any necessary precautions that should be taken prior, during or after implant treatment.

This way, a part of the responsibility is shared with the specialist treating the general condition who should approve our oral implant treatment plan. For legal reasons, written

communication with the specialist is recommended.

Note that many conditions themselves does not complicate or endanger dental implant treatment, but the (medical/radiological) treatment performed or the medication taken might contraindicate or complicate or influence the treatment outcome.

4. Smoking

In heavily smoking patients, we have to decide whether the chronic toxic effect of nicotine in combination with a long-standing periodontal involvement has already altered the soft and hard tissues prior to the implant treatment. As this may increase the risk of intraoperative bleeding, it also affects the tissue healing, and increase the necessity to inform the patient about the additional risks regarding the treatment besides general risks including precancer and cancer lesions.

Smoking by itself is not a contraindication for Strategic Implant® therapy. On the other hand, smoking in combination with chronic periodontal involvement, ill-fitting dentures and other chronic iatrogenic irritations may create potentially malignant lesions (precancerosis) that are risk factors for intraoral carcinoma. In this case, the pre-existing condition should be eliminated first. It must be considered however, that without removing mobile dentures the intra-oral soft tissues cannot be relieved from the damage with these dentures cause.

Heavy smokers typically neglect the risks associated with their addiction. Regarding the treatment of smokers by placing implants into or through the maxillary sinus, it should be noted that heavy smokers generally exhibit extremely thin Schneiderian membranes and that they tend to have clean sinuses without granulation, polyps or mucoceles. Under this aspect they are ideal candidate for this variant of treatment. Smokers benefit greatly from the advent of the technology of the Strategic Implant® because they are not good candidates for bone augmentation and hence they are often rejected for conventional dental implant treatment.

In smokers it is more likely that the callus within extraction sockets disintegrates. To reduce the chances that this created clinical problems, cases of simultaneous extraction and implant placement in heavy smokers can be treated (prophylactically or therapeutically) with vertical reduction of alveolar bone and vestibular decorticalisation of sockets, followed by tight suturing. If vertical bony recessions and thin bony craters are not removed during surgery, the subsequent soft-tissue and bony recessions tend to adversely affect the aesthetic result as vertical implant parts become visible. The survival of the Cortico-basal® implant anchored in the second cortical is not affected, however. The condition described here resembles "non-union" in the field of traumatology and hence the same surgical steps (i.e. debridement) to resolve the situation are carried out.

5. Conditions preventing extractions, implant placement or the preparation of small flaps
We would like to address this topic from a novel angle, as we should have considered the following situations with cautions:

- In which situations would we decide not to extract a tooth due to the patient's compromised general medical condition or missing equipment or deficient standards profound in the dental office?
- Is the limitation presented an issue only on the private dental office? Could these limitations be overcome in a specialized clinic, e.g., a multidisciplinary medical centre?
- What could be done better or more safely in a specialized clinic compared to a private dental office?
- What are the conditions that prevent extractions and caused mainly by medications or the intake of other substances?
- Could the medication change or alteration of the dose (if applicable according to the patient medical condition) or a treatment delay reduce the risks of extractions and implant placement?

5.1 Medical considerations
If we look at the challenges and risks of a routine extraction, it becomes clear that minimally invasive Corticobasal® implants can be placed even in severely compromised health situations.
The placement of a Corticobasal® implant in a flapless procedure is much less invasive than any extraction.

5.2 Considerations regarding equipment and environment
With the help of strong local disinfectants (such as Betadine®), the implants can be placed under almost sterile conditions, even if the overall hygienic status of the oral cavity or the dental office is questionable. Local disinfection is far more important than antibiotic "treatment". In periodontally involved cases with acute or chronic periodontal issues, the placement of conventional dental implants is a dubious procedure, and implant losses are frequent. The assumed reason is that rough implant surfaces can be easily contaminated with bacteria and the blood clot (necessary for the initial healing of the bone around the implant) is in danger to be lost. This relative contraindication does not exist with Corticobasal® implants, since the polished surfaces can hardly be contaminated and osseofixation in the second or third cortical will provide enough stability in infection-free bone areal until the soft tissues have closed and the bony compartment is once again sealed.

Sterilisation of instruments by dry heat and disinfection of the oral cavity permits treatments with Corticobasal® implants even in the most remote corners of the world and in clinics with minimal equipment.

In general, in every dentist's office in which a tooth can be extracted safely, a Corticobasal® implant can also be placed safely.

The applicability of both implants and instrument's sterilization in addition to the local disinfection of the oral cavity permits the treatments with Corticobasal® implants to be utilized even in the most remote corners of the world and in clinics with minimal equipment.

Generally, in every standard dentist's office where a tooth can be extracted safely, a Corticobasal® implant can also be safely placed because of its smooth polished surface that prohibited periimplantitis.

6. Comparison between conditions of surgery for Corticobasal® implants and conditions in traumatology and orthopaedic surgery in field of anaesthesia

Trauma surgery and orthopaedic surgery are performed under general anaesthesia and in rare conditions they can be performed under local or epidural anaesthesia, this can be attributed to the fact that bone surgery outside the skull often requires special, constant positioning of the patient and extremely good aseptic condition. So, Patients whose medical condition does not allow treatment under general anaesthesia are typically excluded from these procedures.

In the field of oral implantology, we are not restricted by the above mention limitation. Some patients may prefer implant treatment under general anaesthesia, sedoanalgesia or intravenous sedation; however, these are not essential for the placement or the success of the implant treatment and related only to the patient`s fear.

7. Comparison between rules/recommendations for load distribution in the maxillofacial field and force distribution through the BIPS on Corticobasal® implants

"The pillars of the mid-facial resistance, are prepared to transmit in ascending direction, so they succumb to impacts of transverse and oblique direction"

Applicability to our field and recommendation:

Depending on the quality of the available bone and the achieved insertion torque for circular BIPS, 10 or more non-parallel implants in the maxilla are used to counteract oblique masticatory forces and in order not to overload the weaker corticals (compared to the mandible), and at the same time the masticatory forces are transferred to the pillars of the midface. Eight Corticobasal® implants or less may be sufficient in the mandible. In general it is recommended to rather over-equip a jaw with implants, than to underequip it. This strategy allows removal of single implants without replacement, should the need arise.

8. Failure modes of Corticobasal® implants and treatment options

Corticobasal® implants in general do not fail due to periimplantitis, as no crater-like bone loss could develop around their thin, vertical shaft if the position of the implant within the

jawbone is correct.

Complications that may cause single implant (or subsequently several or all implant and the BIPS) to fail include:

- Chipping of the thin bone areas occurred during surgery; this can remain unnoticed, especially in flapless treatment protocols. Such chipping also occurs in the area of the 2nd or 3rd cortical.
- Fragmentation of cortical bone areas during placement or bending of the implants.
- Chipping of the thin crestal bone areas as a result of implant and/or bridge mobility.
- Fracture and subsequent necrosis of corticals of an extraction socket, leading to primary non-healing of the implant site.
- Retrograde osteolysis due to pre-existing infections within the bone or due to incorporation of foreign
- particles (chips of ceramics, calculus, etc.) when screwing the Corticobasal® implant in or due to the presence of necrotic bone areas around former endodontically treated teeth. The condition is mainly found in the mandible.
- Overload osteolysis (initially sterile, but can be superimposed by infection if it remains untreated for a prolonged time): While periimplantitis would affects the crestal parts of implants (in conventional implantology), overload osteolysis affects the load-transmitting parts (threads or baseplates) in the 2nd or 3rd cortical. Overload osteolysis occurs mostly within two years following the initial implant placement.
- Necrosis of the bone due to overheating during the drilling.

Applicability to our field and recommendation:

Complications that may necessitate medical treatment following Corticobasal® implant insertion include:

- Infections in the floor of the mouth after placing Corticobasal® implants using **IF Method 5a**. Antibiotics should be administered immediately. Surgical treatment (intraoral) or better extraoral incision must be evaluated. If the conditions stems from an injury to the submandibular gland delayed healing can be expected (8 - 14 days), however incisions are not necessary.
- Infections and retention of granulation tissues which block the ventilation of the maxillary sinus are best treated by Functional Endoscopic Sinus Surgery (FESS) interventions (with various extend) unless antibiotics and topical treatment brings fast relief.

Prophylactic measures to avoid these complications may include:

- The use of strong local antiseptics (e.g. Betadine®) before and during the intervention, applied to the soft tissue, the bone (slots), and the implant itself.
- Preoperative professional tooth cleaning, as well as debridement of granulation and infected soft tissues.
- Control OPT and/or CBCT.

When overload osteolysis occurs, one or several (prosthetically overloaded) implants become slightly mobile increasing the mobility of the prosthesis and consequently most or

all the other implants in the same BIPS will be overloaded as a result of this. This phenomenon is referred to as spreading overload. Without adequate and fast corrective including occlusal adjustment, all or the majority of the implants will fail, and the case has to be retreated. On the other hand, if the condition is detected and treated early, overload-osteolysis can be a reversible phenomenon.

Spreading overload is also frequently observed in cases where BIPS are affected by mechanical accidents during the first two years after implant placement and following prosthetic delivery. There is no correlation between the type of the accident, the location of the impact, the sequence and amount of the implants affected by prosthesis instability. If the corrective intervention is delayed, the overload will spread around all the implants in the same BIPS. Nevertheless some time should be given to evaluate self-healing of the condition after accidents or after early masticatory overload (e.g. after unexpected repositioning of the mandible into the real joint-centric or out of joint centric)

In order to avoid overload osteolysis around the load transmitting surfaces of the implant botulinum-toxin may be used prophylactically. Its use must be combined with an adequate prosthetic concept of loading.

Adequate treatment involves the following:

- Increasing the vertical dimension to disengage the front teeth.
- Adding more implants to the BIPS, possibly without removal of the bridge.
- Removing those implants from the BIPS that are not expected to participate in the transmission of the occlusal load to the deep corticals area (due to extended osteolysis around the load-transmitting implant part and proven or assumed vertical implant mobility).
- Reducing masticatory forces (at least temporarily) with the help of botulinum toxin.
- Removing the blocking (interfering) cusps of the prosthesis to avoid or reduce forces encountered during lateral movements of the prosthesis in mastication.
- If the treatment provider decides to switch from an elastic BIPS to a stiff BIPS, this step must be carried out in the whole jaw.

9. Product and technology training for the treatment providers

Individual product and technology training are necessary even for treatment providers who are highly experience in two-stage implantology.

As already stated in “Konsensus zu basalen Implantaten” (Besch K., Scheiz. Monatsschr. Zahnmed. 1999) and in later, updated versions of ths concensus, Corticobasal® implants differ significantly from those “conventional dental implants”. Differences are found in terms of use; fixation; indication; maintenance and replacement possibilities; the usage of tools; and the possible connections to natural teeth and to conventional dental implants (Table 1).

Both the treatment provider and the conventional implant expert require intense theoretical and personal experience training for the work with and the evaluation of BIPS on Corticobasal® implants.

Training on and experiences with conventional dental implants (designed for osseointegration) are of no importance for understanding the principles of Corticobasal® implants and for working with them. **Most rules of conventional dental implantology are not applicable to Corticobasal® implants.**

Restrictions on the sale and use for Corticobasal® implants to specifically trained and retrained treatment providers are indicated. Restrictions regarding the use of Corticobasal® implants exclusively to maxillofacial and oral surgeons are not recommended by the International Implant Foundation. Both groups of already specialized practitioners would require the same theoretical and surgical training, and besides this both these specialists would need intense prosthetic training.

Corticobasal® implantology is a prosthetically driven discipline of dental medicine, and it is based on clear rules for the surgical part of the treatment[1].

1 *Consensus on Basal Implants (1999, 2006, 2015, 2018, 2021), the International Implant Foundation, Munich, Germany.*