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EickLoxx Micro

A universal osteosynthesis system for small animals weighing less than 3 kg

With
Specialist
Article
by Dr. Daniel
Koch



EICKLOXX MICRO OSTEOSYNTHESIS SYSTEM – COMPONENTS AND CHARACTERISTICS

The EickLoxx Micro has been specially developed for fracture repair in puppies, toy breed dogs and cats weighing less than 3 kg. The polyaxial locking screws are made of titanium and have a diameter of 1.2 mm. A variety of different titanium plates with 1.0 mm thickness are included in the system. The EickLoxx Micro can be used for the following indications: Radius / ulna fractures, metatarsal fractures, jaw, pelvic and scapula fractures as well as arthrodesis and much more.

The EickLoxx Micro fits into the existing EickLoxx range and complements it in the lowest weight category, which is becoming increasingly important.



Titanium EickLoxx Micro Bone Plates

- ▶ Bendable and twistable
- ▶ Multidirectional locking
- ▶ System 1.0

197410 – 197418

Titanium Locking Screws

- ▶ Self-drilling, self-tapping
- ▶ 35 Titanium Locking Screws Ø 1.2 mm, magenta (from 4 – 10 mm)

The geometry of the screw head and screw enables polyaxial placement with the Drill Guide System in $\pm 15^\circ$ longitudinal and transverse pivoting.

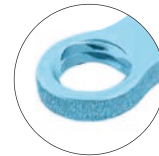
197425 – 197431

Characteristics

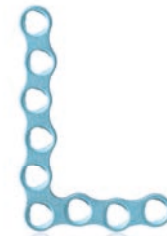
- ▶ EickLoxx Micro bone plates minimise contact with the periosteum. This reduces the iatrogenic load on the bone perfusion common in conventional compression plates.
- ▶ Preservation of the bone perfusion significantly reduces the risk of infection and accelerates bone healing
- ▶ The risk of infection is further reduced through the biocompatibility of titanium and the absence of fretting

Biological Benefits

- ▶ Reduces damage to the vascular supply
- ▶ Increases resistance to infection
- ▶ Accelerates healing



197410



197413



197414



197415



197416



197417



197418



197429

EICKLOXX MICRO OSTEOSYNTHESIS SYSTEM – ITEM LIST

EickLoxx Micro Osteosynthesis System		
Item No.	Description	Quantity
197400	Complete set, consisting of:	
197401	EickLoxx Micro Tray, without instruments and implants	1
197403	Drill Guide Funnel, system 1.2	1
185514	Plate and Screw Holding Forceps, titanium, angled, L 150 mm	1
197402	Twist Drill, Ø 1.0 mm, AO Quick Coupling	1
197404	Screwdriver Handle Small, dental coupling	1
197405	Screwdriver Blade, Torx 6, not cannulated, 50 mm dental coupling	1
185517	Depth Gauge, measuring range 30 mm, probe 1.0 mm	1
197410	EickLoxx Micro Bone Plate, 7 holes, system 1.0, light blue, dimensions (in mm): L 27.5 x W 3.5 x H 1.0	1
197411	EickLoxx Micro Bone Plate, 8 holes, system 1.0, light blue, dimensions (in mm): L 31.5 x W 3.5 x H 1.0	1
197412	EickLoxx Micro Bone Plate, 20 holes, system 1.0, light blue, dimensions (in mm): L 79.5 x W 3.5 x H 1.0	1
197413	EickLoxx Micro Bone Plate, L-plate, 9 holes, system 1.0, light blue, dimensions (in mm): L 23.5 x W 16.0 x W 3.5 x H 1.0	1
197414	EickLoxx Micro Bone Plate, T-plate, 10 holes, system 1.0, light blue, dimensions (in mm): L 23.5 x W 19.5 x W 3.5 x H 1.0	1
197415	EickLoxx Micro Bone Plate, Y-plate, 12 holes, system 1.0, light blue, dimensions (in mm): L 44.5 x W 3.5 x H 1.0	1
197416	EickLoxx Micro Bone Plate, Y-plate, 13 holes, system 1.0, light blue, dimensions (in mm): L 48.5 x W 3.5 x H 1.0	1
197417	EickLoxx Micro Bone Plate, 4x2 holes system 1.0, light blue, dimensions (in mm): L 18.5 x W 7.5 x H 1.0	1
197418	EickLoxx Micro Bone Plate, 2x2x2 holes, system 1.0, light blue, dimensions (in mm): L 18.0 x W 9.5 x H 1.0	1
197425	Titanium Locking Screw, Ø 1.2 x L 4 mm, multi-directional, magenta, Torx 6, self-drilling, self-tapping	5
197426	Titanium Locking Screw, Ø 1.2 x L 5 mm, multi-directional, magenta, Torx 6, self-drilling, self-tapping	5
197427	Titanium Locking Screw, Ø 1.2 x L 6 mm, multi-directional, magenta, Torx 6, self-drilling, self-tapping	5
197428	Titanium Locking Screw, Ø 1.2 x L 7 mm, multi-directional, magenta, Torx 6, self-drilling, self-tapping	5
197429	Titanium Locking Screw, Ø 1.2 x L 8 mm, multi-directional, magenta, Torx 6, self-drilling, self-tapping	5
197430	Titanium Locking Screw, Ø 1.2 x L 9 mm, multi-directional, magenta, Torx 6, self-drilling, self-tapping	5
197431	Titanium Locking Screw, Ø 1.2 x L 10 mm, multi-directional, magenta, Torx 6, self-drilling, self-tapping	5

A new angle-stable osteosynthesis system for treating very small bones: EickLoxx Micro

Case Reports

For some time now, osteosynthesis in dogs and cats has been carried out preferably with angle-stable implant systems. In the following case reports we can present the EickLoxx Micro System, a further expansion to our product range. This will allow surgeons to use implants for small animals with particularly tiny bones. The EickLoxx Micro osteosynthesis system is suitable for the treatment of radius, pelvic, scapula and jaw fractures in small dogs and cats; also indicated are metacarpal, metatarsal fractures and for additional implant support in other situations.

Introduction

The introduction of angular stability (Perren, 2002) between screw and plate brought significant advantages for osteosynthesis: the screws rarely loosen. Osteosynthesis systems are suitable for the treatment of radius fractures in small dogs and pelvic, scapula and jaw fractures as well as metatarsal fractures. Avoiding compression between the plate and the bone allows for a good blood supply and ultimately the bone heals faster than with non-angle-stable implant systems (Sikes et al., 1998; Cronier et al., 2010; Watrous et al., 2018).

During the same period, the switch from steel to titanium implants took place, mainly to reduce the infection rate (Eijer et al., 2001; Griffon, 2005). Various systems are available for veterinary orthopedics, including the Locking Compression Plate® Shortly (LCP) (Haaland et al., 2009), the Advanced Locking Plating System® (ALPS) (Guerrero et al., 2014) or the EickLoxx Small (Koch and Koch, 2019). The latter is used for dogs and cats weighing up to 15 kg. The sizes used (1.7 mm, 2.3 mm, 2.7 mm) correspond almost exactly to the standard systems defined by the working group for osteosynthesis issues (AO). However, the trend towards small dogs now requires implants that can be screwed onto very small bones. The new EickLoxx Micro osteosynthesis system made of titanium with angle-stable, polyaxially usable screws with an outside diameter and plates with a thickness of 1.0 mm meets this need, the use of which is described and explained here using examples.

inserted. The caudal 8-hole plate with five 1.2 mm screws was placed slightly against the base of the spina scapulae, which extended the drilling depth for the screws and therefore improved anchoring. The cranial plate had 4 holes and 2 screws (Fig. 2). The cat recovered well and no limitation of shoulder mobility was found during a follow up consultation, the cat's gait was also normal.



Fig. 2a, 2b, 2c and 2d: Pre- and postoperative X-ray images of the cat showing a basilar scapula fracture and subsequent treatment with two parallel EickLoxx Micro plates along the spine of the scapulae.

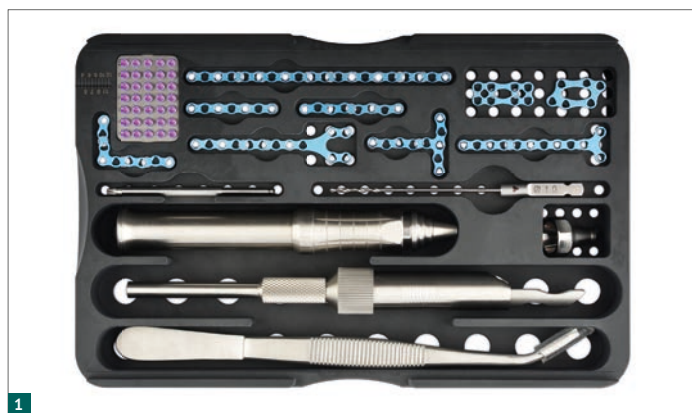


Fig. 1: EickLoxx Micro set consisting of locking screws (1.2 mm), various microbone plates, Torx 6 screwdriver blade, twist drill (1.0 mm), drilling guide funnel, depth gauge and plate screw holding tweezers (from top left to bottom right).

Case reports

The first patient was a 3 year old cat, she was involved in a RTA which resulted in a fracture of the right scapula (Fig. 2) and also a hind limb tibial fracture, the latter was fixed with a standard locking plate. Conservative treatment of the scapula was rejected as the fragments were severely displaced and the cat showed significant gait restriction. The right scapula was accessed parallel to the spina scapulae. The supraspinatus muscle was retracted cranially; the ends of the fragments could then be mobilized, despite obstructing muscle bellies, to such an extent that the functional alignment of the scapula was achieved. The thin scapula was treated with two EickLoxx Micro plates in parallel alignment – this was also because the small distal fragment with the shoulder joint left little space for screws to be

In a second case, also a cat that had been in a RTA, the EickLoxx Micro plates were used for a partial tarsal arthrodesis. It was a dorsal dislocation between the distal row of tarsal bones and the metatarsals. Since the cat was quite heavy at 6.5 kg, it was decided to treat the dislocation on the dorsal side using two plates. An ALPS® plate (size 6.5, 3 screws) and a 5-hole EickLoxx Micro plate with four screws were used. Here too, the cat recovered well; a control X-ray was not taken (Fig. 3).

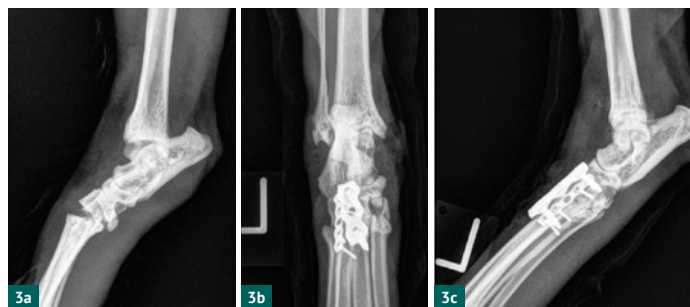


Abb. 3a, 3b and 3c: Pre- and postoperative radiographs of a cat with traumatic dorsal tarso-metatarsal instability. The subluxation was treated with an ALPS® and an EickLoxx Micro plate provided.

In a third case, the owners of a 6-year-old mixed-breed dog weighing 8 kg, that had fallen from a great height, reported that the symphysis fracture of the mandible was treated with cerclage wire. The wire was removed after 4 weeks, but the dog was still unable to eat dry food. The preoperative examination in our practice, around 8 months after the initial trauma, revealed a painless instability of the symphysis of 4 mm vertically. During the following operation, the symphysis was separated with a scalpel, the fibrotic remnants were removed and then with a 1.0 mm thick cerclage wire – passed through the mouth caudal to the canine and twisted distally – as well as using two EickLoxx Micro plates bridging the two mandibular branches and a total of 7 screws (Fig. 4). The screw holes were not easy to drill because there was already inactive osteoporosis of the cranial mandible and not all screws had long drilling channels. The cerclage wire was removed after 6 weeks.

One year after the revision surgery, the dog was presented again. Two screws of the implants had become loose and the symphysis had an instability of 2 mm. The dog was able to eat well.

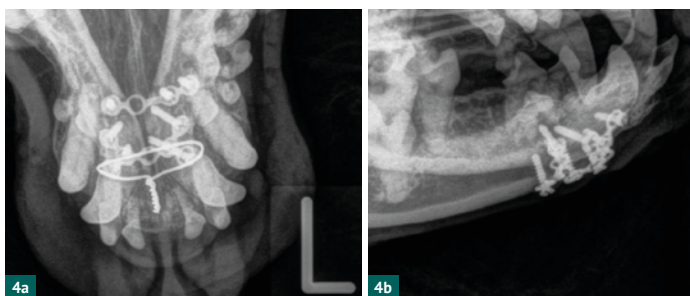


Fig. 4a and 4b: Postoperative image and 6-week control image of the dog with chronically unstable symphysis between the mandibular branches. The cerclage was removed, two screws of the EickLoxx Micro system were slightly loose, but did not need to be removed.

The classic application of microimplants is distal radius and ulna fractures in small dogs, for which even the 2.0 mm implants of the AO specification are too large. Here (Fig. 5) we show a model of a plastic bone from a small dog with a typical distal radius / ulna fracture, which was treated with a straight 1.2 mm plate.



Fig. 5: Treatment of a radius/ulna fracture using the EickLoxx Micro osteosynthesis system on a plastic bone.

Discussion

Treating fractures in small dogs and cats involves a balancing act. On the one hand, the space available for fixation is usually limited and quite short at the distal radius. Also there is not as much skin available, especially on the distal limb, to be closed over a thick implant.

This leads to the desire for small and thin implants or those with a specific shape in order to be able to place enough screws in the same area. On the other hand, the patient should be able to stand on the limb the next day, which requires a minimal amount of flexural rigidity. Now we know from physics that the rigidity of the plate, based on its height, is the 3rd power. Increases, leading to poor biomechanical properties of the microimplants (Muir et al., 1995). In addition, the titanium used today has an elastic modulus that is only half as large as steel (Geetha et al., 2009). So you should try to use the largest possible implant on the operating table. All of this leads to the rule of thumb that with angle-stable implants, at least two, but preferably 3 screws should be placed on both sides of the fracture (Savoldelli and Montavon, 1995).

The EickLoxx Micro osteosynthesis system meets the above requirements in that a variety of possible plate configurations are already available. These include L, T and Y plates. In addition, a plate is also made to be slightly curved so that more screws can be placed on each side of the fracture without losing the plate's flexural rigidity. Especially in the case of radius/ulna fractures, this leads to an optimization of the care, as there is often only little space for the placement of 2 or 3 screws. Small dogs are also dependent on stable fixation, as the reduced vascularization of the distal portion of the radius compared to larger dogs is a contraindication to conservative fracture treatment with the subsequent risk of the bones not uniting (Welch et al., 1997).

Our limited number of cases demonstrated that the plates had sufficient stability. Especially in the case of the symphysis fracture of the mandible, the failure to achieve fixation should have resulted in an implant fracture, but the plates withstood the forces. However, because microimplants still have a very weak resistance to bending forces, double plating makes sense. We implemented this in the three clinical cases and recommend this for all possible indications, provided there is enough bone substance available. If the second plate is placed at a 90° angle to the first, the overall stiffness increases significantly because instead of the height, the width is taken into account to the third power in the calculation of the implant stiffness.

Compared to implants from other manufacturers, the screws can be inserted at an angle of up to 20° from the vertical in relation to the plate. This facilitates, among other things, fixation of small bones, such as dorsal tarsometatarsal luation, which otherwise requires very precise drilling (Inauen et al., 2009). The T, L and Y plates included in the set allow for additional fixation options, and the plates can also be shortened to the desired size using suitable pliers.

Similar to other microimplants, the 1.2 mm EickLoxx Micro osteosynthesis set has the following areas of application for dogs and cats, which would expand the cases for the EickLoxx

osteosynthesis range: Radius / ulna, pelvis and jaw branch fractures in animals under approx. 2.5 kg body weight; Metatarsal and metacarpal fractures, scapula and vertebral fractures in patients weighing less than 5 kg and as additional or Second implant for various indications (arthrodeses, fractures of the long bones).

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