

# Clinical Sheet

## OPENING WEDGE OSTEOTOMY WITH A HETEROLOGOUS PERFUSED WEDGE

The perfusion of bone grafts may improve their incorporation and remodeling.



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The extent of the symptoms related to knee arthrosis is linked to the severity of the degeneration of the joint cartilage. The causes of the degeneration are manifold, including aging, trauma, misalignments of the musculoskeletal system, inflammatory and autoimmune conditions. The risk factors include an uneven distribution of the load, that favors the medial or lateral compartment of the joint, due to varus or valgus, as well as excess body weight and the type of work or sport activity performed.

In the most serious cases, treatment requires execution of a unicompartmental or total arthroplasty. In less serious cases and in cases of varus, in addition to conservative treatments, the patient may undergo a medial opening wedge or a lateral closing wedge osteotomy, aiming to restore correct tibiofemoral alignment and thus redistribute weight correctly between the compartments. Opening wedge osteotomy is preferable: it entails the insertion, post osteotomy, of a bone wedge under the tibial plateau in order to eliminate varus. The wedge is stabilized with a plate outside the metaphysis. Initially, the load is borne by the plate. It may be removed only once osseointegration and, possibly, remodeling of the graft have been completed.

These two processes may be promoted if the whole graft volume contains cells and growth factors, a prerequisite that may be met through perfusion of the graft with suitable devices.

## Materials

Opening wedge osteotomy involves the use of a tibial osteotomy wedge (Osteoplant, Bioteck). The dimensions of this wedge are 50 x 40 x 10 mm and it is entirely obtained from equine cancellous bone tissue. The cancellous section is harvested from equine femur and undergoes the exclusive Zymo-Teck process to eliminate antigens, so as to assure the preservation in the graft of the bone collagen in its native form.

The presence of this protein guarantees excellent mechanical properties of resistance to compression and

elasticity, which make it possible for the bone graft to be handled with no risk of breaking.

The graft is perfused by using Awayr (Bioteck), a device that allows the perfusion of the entire volume of the graft with a fluid chosen by the surgeon, while eliminating the air contained therein.

This happens thanks to a special labyrinth filter, consisting of tiny channels a few microns in diameter, and allows air to escape but retains the perfusion liquid.



**Fig. 1** – Anteroposterior X-ray of the patient's joint bearing weight. Note the reduced articular space and the presence of varus.



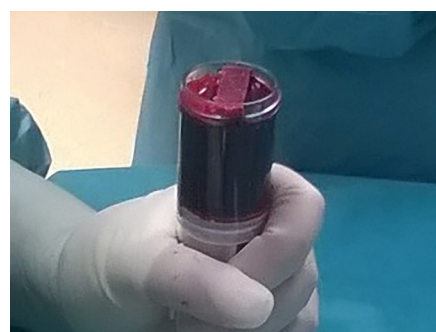
**Fig. 2** – Lateral view X-ray.



**Fig. 3** – The Awayr device consists of a perfusion chamber topped by a plunger, inside which is the labyrinth filter that allows the air removed from the graft to escape.



**Fig. 4** – The collagen preserved cancellous wedge for tibial osteotomy is available in various sizes and formats.



**Fig. 5** – The wedge at the end of perfusion, still inside the Awayr.



**Fig. 6** – At the end of perfusion, the whole volume of the graft is saturated with medullary extract and the air is completely removed.

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## Results

The sheet describes a conservative surgical procedure on a male patient suffering from knee arthrosis. The 41-year-old patient presented with pain, antalgic gait, limited joint movement with a significant extension and flexion deficit. The pain was felt mostly in the internal tibiofemoral compartment, consistent with the presence of varus.

Considering the age of the patient, a treatment that included a tibial opening wedge osteotomy was opted for, with the interposition of an Osteoplant wedge perfused with autologous whole bone marrow. Access to the proximal tibia of the medial side was therefore gained and the opening wedge osteotomy was performed, creating a suitable osteotomy space, where the equine cancellous wedge was inserted. Said wedge had been perfused previously to improve enrichment of the graft with mesenchymal cells found in the marrow and thus promoting bone regeneration.

The osteotomy reconstruction was fixed with a plate and screws to assure primary mechanical stability.

The patient wore a brace for the first two weeks after the procedure, with the knee blocked in full extension and did exercises to lengthen the quadriceps from the second day following the procedure.

After the first two weeks, the brace was unblocked and the patient started doing active and passive exercises to restore full range of motion. The patient was allowed to place partial and progressive weight on the joint from the fifth week and reached full load in the eighth week. The patient was then visited periodically.

Fourteen months after the procedure, the X-rays showed complete osseointegration of the graft and its possible remodeling, evidenced by a change in its radiopacity which had, at first, been slightly higher than that of the surrounding bone tissue and now appeared completely the same. The plate was then removed. Currently, the patient performs moderate physical activity without limitations and has no significant symptoms.



**Fig. 7** – Opening of the osteotomy, seen in intraoperative fluoroscopy.



**Fig. 8** – Having been perfused, the wedge is inserted into the osteotomy site.



**Fig. 9** – The wedge is stabilized with the suitable plate.



**Fig. 10** – Fluoroscopy image at the end of surgery.



**Fig. 11** – X-ray at the end of surgery. The wedge is slightly more radiopaque than the surrounding tissue.



**Fig. 12** – X-ray 14 months after removal of the plate. The radiopacity of the graft is similar to that of the bone tissue.