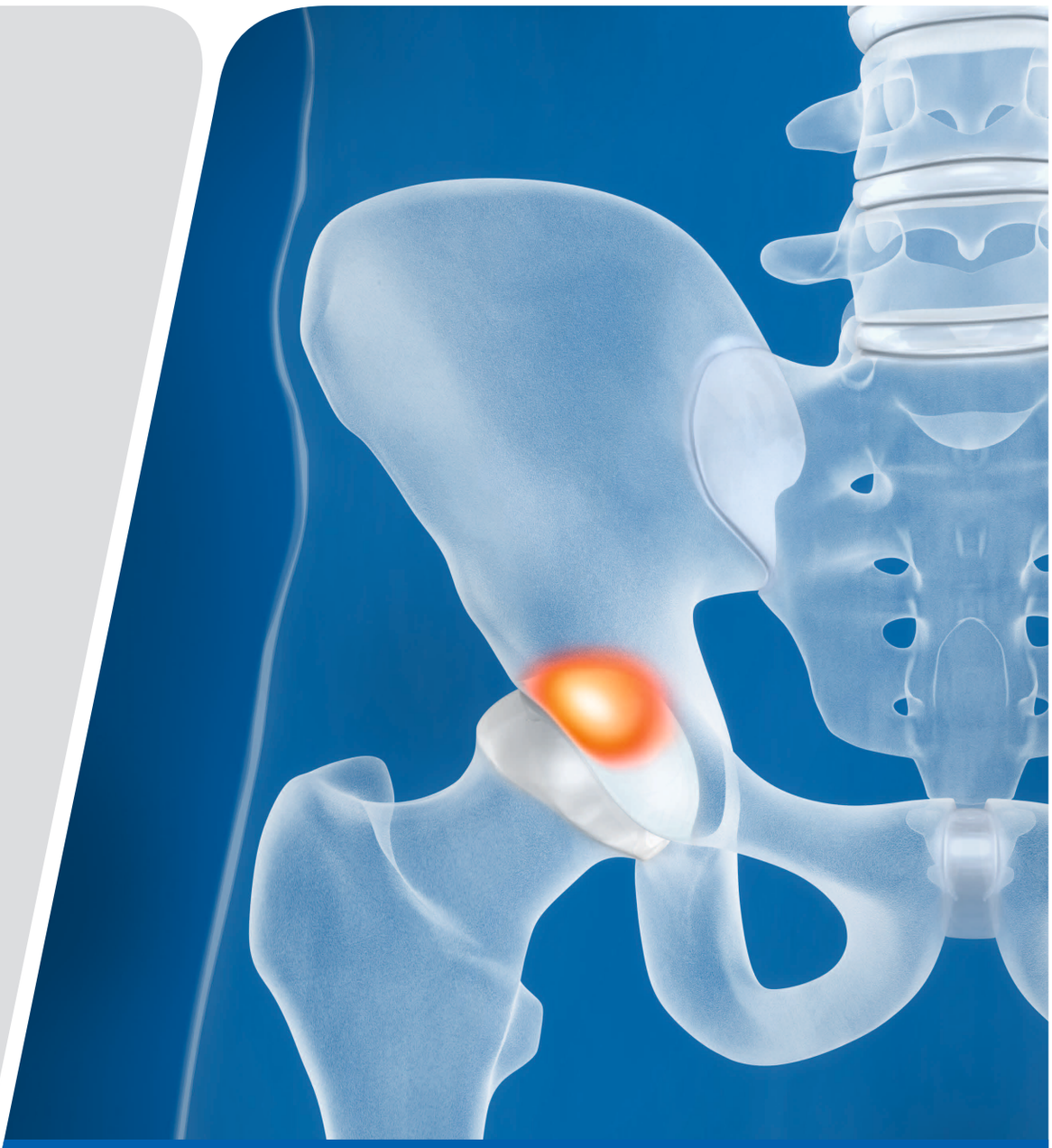
Geistlich
Surgery

Chondro-Gide®

AMIC® Arthroscopic Hip Technique

Autologous Matrix Induced Chondrogenesis



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CARTILAGE REGENERATION

Chondral Lesions in the Hip Joint

Chondropathies of the acetabulum and the femoral head are a frequent cause of pain and functional limitation. Moreover, if cartilage defects in the hip are not adequately repaired, progression of the damage and arthritic changes may occur. Several treatment options are available to repair chondral lesions in the hip including debridement, microfracture, autologous chondrocyte implantation (ACI) and now the AMIC® arthroscopic hip technique. [1, 2]

Arthroscopic procedures are more desirable than open surgery because they are less invasive and hence reduce the risk of complications, such as infections and avascular necrosis of the femoral head and allow shorter recovery time, resulting not only in lower overall treatment cost but also higher patient satisfaction. [2, 3]

AMIC® – Autologous Matrix Induced Chondrogenesis

Autologous Matrix Induced Chondrogenesis (AMIC®), is an innovative biological surgical procedure developed by Geistlich Surgery for the treatment of chondral lesions. This unique, single-step procedure combines the microfracture method, which is an established first-line treatment with the application of Chondro-Gide®, a porcine collagen matrix. [4,5]

The functional principle of microfracture is based on surgically induced bleeding at the osteochondral junction. Multipotent mesenchymal progenitor cells, cytokines and growth factors form a blood clot, which is covered and stabilised by the Chondro-Gide® matrix. Cells attach and differientiate on the scaffold, thereby inducing cartilage regeneration. [6, 7]

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Chondro-Gide® Bilayer Collagen Matrix

Chondro-Gide® offers optimal structure and composition for articular cartilage regeneration. It is manufactured in a patented process to form a unique bilayer matrix (Fig. 1) with a compact and a porous side.

The compact layer (Fig. 2) consists of a dense, cell occlusive surface, which prevents progenitor cells from diffusing into the joint space and protects the site from mechanical stress. The porous layer (Fig. 3) of the matrix is composed of loose collagen fibres that support cell invasion and attachment. The arrangement of the fibres provides high tensile strength and resistance to tearing. If necessary, Chondro-Gide® can be held in position by glue or sutures.

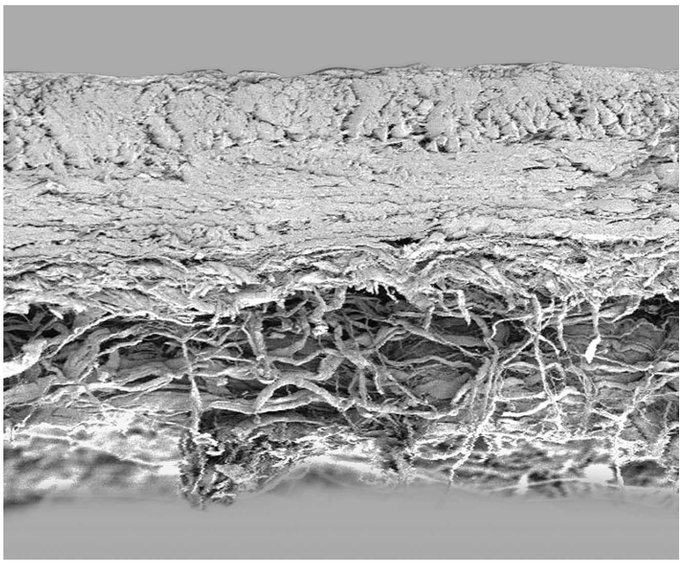


Fig. 1: Unique bilayer structure of Chondro-Gide® (100x)

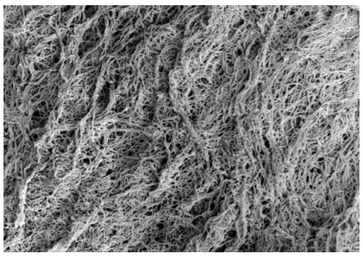


Fig. 2: Compact, cell-occlusive surface (SEM 1500x)

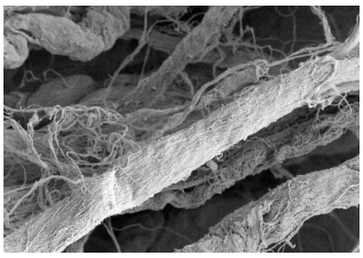


Fig. 3: Porous, cell-adhesive surface (SEM 1500x)

Advantages of the AMIC® Arthroscopic Hip Technique

- Cost effective one-step procedure for the treatment of lesions not suitable for microfracture [>2 cm^2] [2]
- Protection of blood clot in a «bioactive» chamber provided by the Chondro-Gide® matrix
- Minimally invasive surgical technique allows shorter hospitalisation and faster rehabilitation
- Ad hoc usage and off-the-shelf supply of Chondro-Gide®, the leading natural collagen matrix for cartilage regeneration

Indications and Exclusion Criteria

Indications

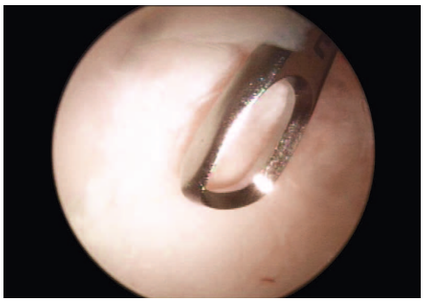
- Grade III or IV chondral lesions (Outerbridge classification) on acetabulum or femoral head
- AMIC® on acetabulum and microfracture on femoral head for kissing lesions
- Lesion size of 2–8 cm^2

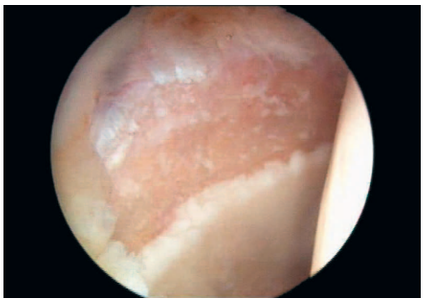
Exclusion Criteria

- Metabolic arthropathies
- Chronic inflammatory systemic disorder
- Axial malalignment (concomitant realignment procedure required)
- Allergy to collagen
- Haemophilia A/B
- Patients under 18 years of age

Surgical Technique

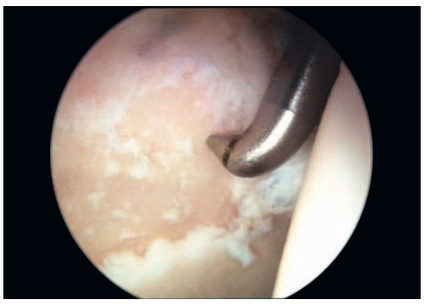
(Surgical technique by Prof. Andrea Fontana, Lanzo Hospital, Como, Italy)



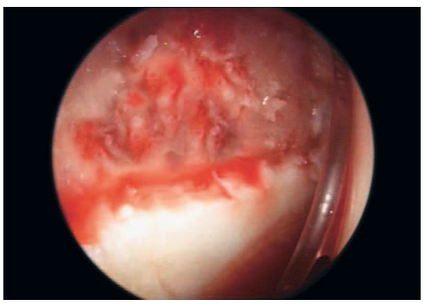


Diagnostic Arthroscopy Placement of the patient in the lateral decubitus position. The hip is accessed through the proximal trochanteric and anterior paratrochanteric portal. An arthroscopic examination of the hip joint articulated surfaces is performed. Size and depth of the lesion are carefully assessed.

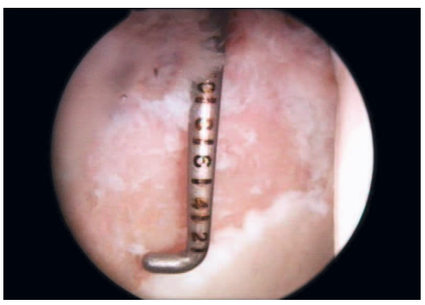
Site preparation If necessary, labral tears, femoroacetabular impingement or synovial lesions are treated. Destroyed and unstable cartilage is removed using angled curettes or motorized shavers to achieve a well contained defect.



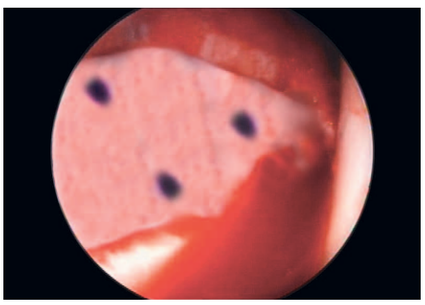
Microfracture of the subchondral bone at the base of the lesion is performed using a sharp angled awl, from the periphery of the lesion towards the centre, at intervals of 4–5 mm. It is important to penetrate the subchondral bone perpendicularly, which can be challenging, particulary in the superoanterior areas of the acetabulum. In these cases microfracture is achieved by scratching the subchondral bone.



Bleeding from the bone marrow can be verified after reducing water pressure. Residual tissue is carefully removed and adequacy of the subchondral bleeding is verified.



Preparation of Chondro-Gide® An exact measurement of the defect is made using an arthroscopic probe. The dry Chondro-Gide® matrix is trimmed to be slightly smaller than the shape of the defect. This compensates for the approximately 10% increase in matrix size after moistening.



Placement of Chondro-Gide® Before placement, the smooth layer of the Chondro-Gide® matrix is marked with a few dots using a surgical marker[9] to distinguish the layers. Residual fluid is removed from the joint space and the matrix is inserted under «dry conditions». With the use of a grasper and an arthroscopic cannula, the matrix is placed directly into the articular space. The porous layer faces the bone surface.

Intraoperative examination It is recommended to release traction and to perform a series of 4 to 6 extension and rotation movements. Traction is then reapplied and the position of the Chondro-Gide® is arthroscopically verified. Fibrin glue can be used to enhance stability of the matrix.

Follow-up treatment

Thrombosis prophylaxis with low molecular weight heparin is recommended until full weight-bearing is archieved. Non-steroidal anti inflammatory drugs can be administered as analgesics.

	1 day	2 days to <4 weeks	4 weeks to 6 months	6 months to <1 year	1 year
Load bearing	None	None	Partial load bearing up to 7 weeks; afterwards, full	Full	Full
Mobilisation	Continuous passive motion at 60° of hip flexion	Regain step-wise full range of motion	No restriction	No restriction	No restriction
Physiotherapy and Sport	› No sporting activities › Isotonic and isometric quadriceps exercises	› No sporting activities › Active and passive physiotherapy	Light sporting activities (e. g. swimming and cycling)	Jogging	Full

(Source: Prof. Andrea Fontana, Lanzo Hospital, Como, Italy)

Safety and Quality

The proprietary manufacturing process of Chondro-Gide® involves several steps before the bilayer design is achieved. Standardised processes under clean room conditions, rigorous in-process and end control guarantee a high quality natural product. Biocompatibility was tested according to international standards. Chondro-Gide® contains collagen. In very rare cases allergic reactions may occur.

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Product Porfolio

Art.-No.	Description
30890.3	Chondro-Gide® Bilayer Collagen Matrix 20 x 30 mm
30915.5	Chondro-Gide® Bilayer Collagen Matrix 30 x 40 mm
30939.9	Chondro-Gide® Bilayer Collagen Matrix 40 x 50 mm

References

[1] Yen YM, Kocher MS. Chondral lesions of the hip: Microfracture and chondroplasty. Sports Med Arthrosc. 2010 Jun;18(2):83-9

[2] Fontana A, Bistolfi A, Crova M, Rosso F, Massazza G. Arthroscopic treatment of hip chondral defects: autologous chondrocyte transplantation versus simple debridement--a pilot study. Arthroscopy. 2012 Mar;28(3):322-9

[3] Botser IB, Smith TW Jr, Nasser R, Domb BG. Open surgical dislocation versus arthroscopy for femoroacetabular impingement: a comparison of clinical outcomes. Arthroscopy. 2011 Feb;27(2):270-8

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[5] Steadman JR, Rodkey WG, Briggs KK. Microfracture to treat full-thickness chondral defects: surgical technique, rehabilitation, and outcomes. J Knee Surg. 2002;15(3):170-6

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[7] Dickhut A, Dexheimer V, Martin K, Lauinger R, Heisel C, Richter W. Chondrogenesis of human mesenchymal stem cells by local transforming growth factor-beta delivery in a biphasic resorbable carrier. Tissue Eng Part A. 2010 Feb;16(2):453-64

[8] Fontana A. A novel technique for treating cartilage defects in the hip: a fully arthroscopic approach to using autologous matrix-induced chondrogenesis. Arthrosc Tech. 2012 Apr 21;1(1):E63-8

[9] Use of a marker pen without methylene blue or crystal violet ink is recommended. Getgood A, McNamara I, Kili S, Bhullar T, Henson F. Reduced chondrocyte viability is associated with the use of surgical marker pen ink. Am J Sports Med. 2011 Jun;39(6):1270-4

Chondro-Gide® Bilayer Collagen Matrix 30 x 40 mm

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