Costal chondrocyte-derived pellet-type scaffold-free autologous chondrocyte implantation for osteochondral defects with up to 10-mm depths

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Disclosure

No conflict of interest

Costal chondrocyte-derived pellet-type scaffold free ACI (CCP-ACI)

Unlike previously applied ACI techniques, in CCP-ACI, chondrocytes are implanted without a scaffold or covering membrane, providing structural support, and simply covered with fibrin glue.

There might be a concern about collapse of the chondrocyte graft because of weak structural support, when CCP-ACI is performed in OCD lesions with weak subchondral bone support.

Purpose

To evaluate clinical, radiographic, and MR outcomes of CCP-ACI performed on OCDs up to 10 mm depth within 5 years of follow-up.

Material

Retrospective search for CCP-ACI for treating OCD lesions

Number of knees (patients)	10 (10)
Age (years)	36.5 (36.5, 20-55)
Female / Male	7 / 3
Body mass index (kg/m^2)	27.6 ± 3.6
Right / Left	5 / 5
Size of osteochondral defect (cm^2)	3.83 (4.25, 2-6)
Depth of osteochondral defect (mm)	7.1 (7, 6-9)
MFC / LFC	6 / 4

Evaluation

- **Clinical evaluation (preop & postop 1y, 2y, and5y)**

  IKDC, Lysholm, and VAS score

- **Radiographic evaluation (preop & postop 6m, 1y, 2y, & 5y)**

  HKA angle and K-L grade

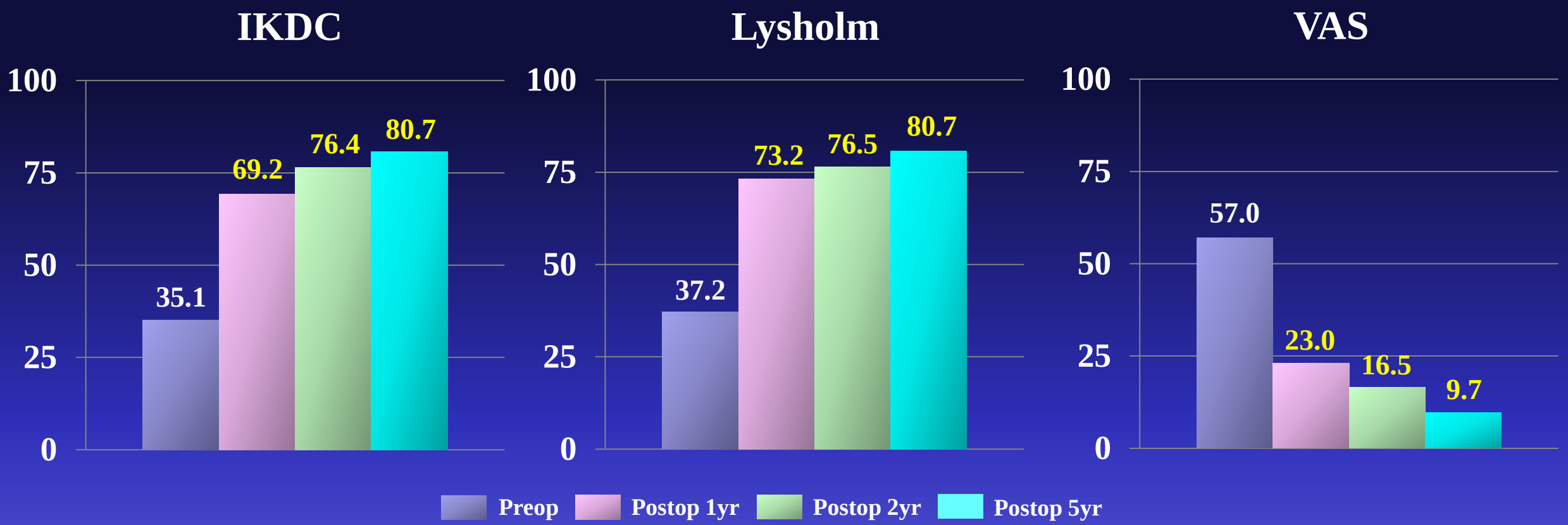
- **MR evaluation (preop & postop 6m, 1y, 2y, & 5y)**

  MOCART 2.0 score and Depth of defect

Case M / 20

MOCART 2.0	**50, 50, 57, and 70**
Defect depth	**8.7, 9.0, 8.8, and 8.8 mm**

Clinical results



Significant different from preoperative value ($p<0.05$)

Radiographic results

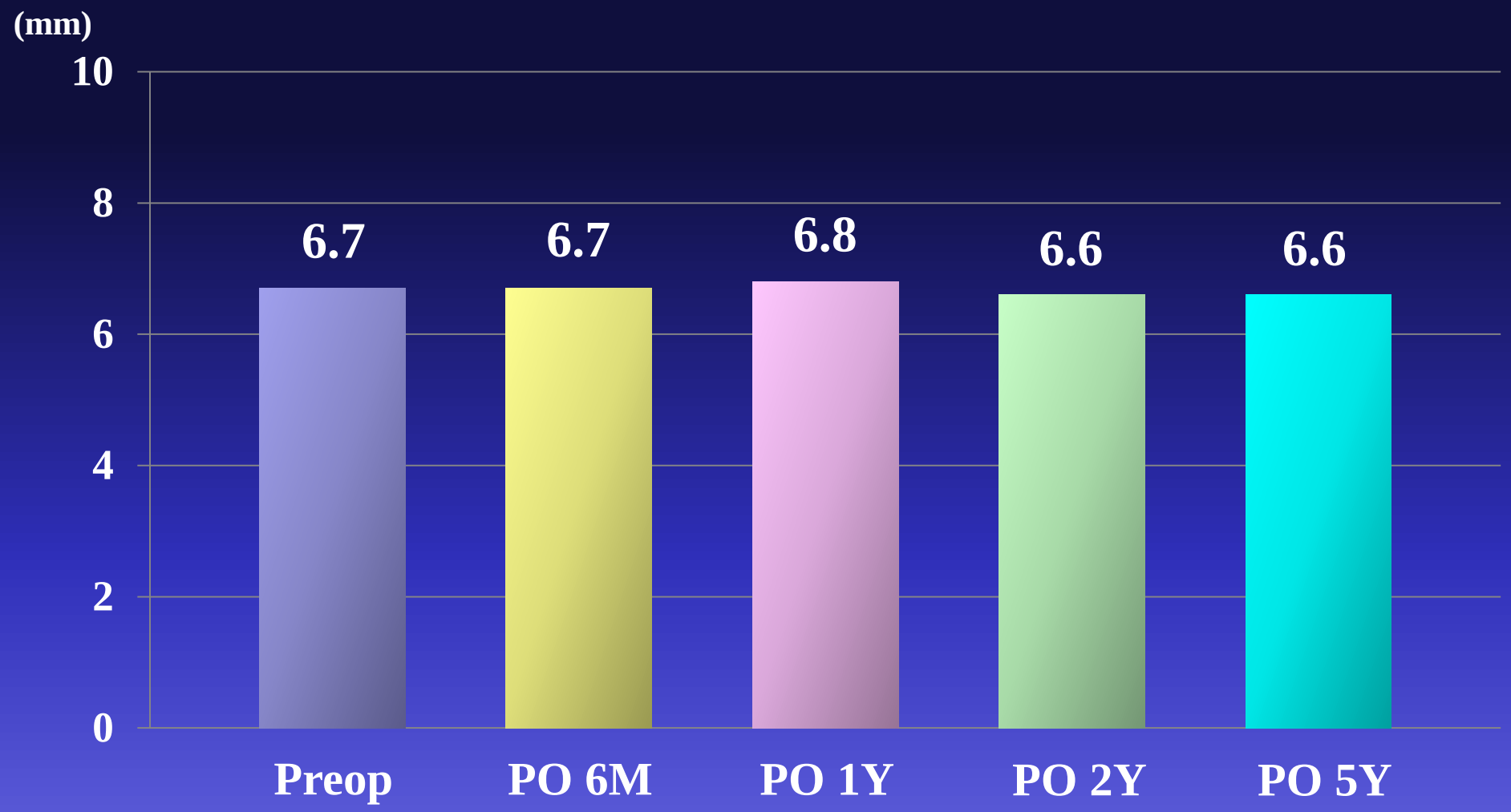
	Preop	Postop 6m	Postop 1y	Postop 2y	Postop 5y
HKA angle (°)	Varus 2.0± 1.8	Varus 2.1± 0.5	Varus 2.3± 0.5	Varus 2.2± 0.5	Varus 2.4± 0.4
K-L grade (0/1/2/3/4)	2/5/3/0/0	2/5/3/0/0	2/5/3/0/0	1/6/3/0/0	0/6/4/0/0

MOCART 2.0 score

	Postop 6m	Postop 1y	Postop 2y	Postop 5y
Total	50 (48.75-56.25)	50 (48.75-61.25)	57.5 (53.75-66.25)	65 (58.75-70)
Cartilage volume	15 (15-16.25)	15 (15-16.25)	15 (15-16.25)	15 (15-20)
Integration	15 (13.75-15)	15 (13.75-15)	15 (15-15)	15 (15-15)
Surface	0 (0-5)	0 (0-1.25)	0 (0-10)	0 (0-6.25)
Structure	0 (0-0)	0 (0-2.5)	0 (0-10)	0 (0-10)
Signal intensity	10 (10-10)	10 (10-10)	10 (10-15)	10 (10-15)$^{\delta}$
Bony defect or overgrowth	0 (0-0)	0 (0-0)	0 (0-0)	0 (0-0)
Subchondral changes	10 (10-10)	10 (10-15)	12.5 (7.5-15)	17.5 (11.25-20)

Significant difference compared to 6-month postoperative value ($p<0.05$)

Depth of defect



Conclusion

The CCP-ACI provided satisfactory mid-term outcomes in OCD up to 10mm depths without bone grafting.

There could be a stable CCP-ACI graft in OCD because of the mechanically supportive environment created by 3D culture and high chondrocyte density in the pellet, resulting in active synthetic activity.

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