Our aim is to develop a biodegradable artificial ovary where isolated follicles and ovarian cells (OCs) are able to survive and grow, in order to restore fertility in women diagnosed with pathologies at high risk of ovarian involvement. To this end, isolated preantral follicles and OCs encapsulated in a 1% SLM alginate matrix were autografted to a peritoneal bursa of six NMRI mice. One week after grafting, the beads were found to be invaded by infiltrating capillaries. A high proportion (12.1%) of proliferating OCs and low percentage (2.3%) of atretic OCs were observed in the beads. Seven to 35.5% of grafted follicles were identified within and surrounding the alginate matrix, 81% of which were TUNEL-negative. Most follicles were at the secondary stage and 3 were at the antral stage, demonstrating their ability to grow in the matrix. This was confirmed by Ki67 immunostaining, where 77% of follicles were shown to contain Ki67-positive granulosa cells. The health status of these granulosa cells was evaluated by inhibin alpha immunostaining, which indicated that a high proportion of follicles (91.2%) were healthy and still able to produce inhibin alpha in the artificial ovary. Our results suggest that a transplantable artificial ovary is now wholly conceivable, opening up new perspectives to restore endocrine activity and fertility in women at high risk of ovarian involvement.