Background

SUI (Stress urinary incontinence) is a major problem affecting 40% of women between 40 and 60 years. Sling operations are currently the gold standard of treatment for this condition [1].

Aim of study

Our novel construct is a pure collagen mesh woven from high strength collagen threads. Our aim is to test the biocompatibility and tissue integration of this mesh in a rat model.

Materials & Methods

Akkus and co-workers developed a novel electrocompaction process to transform pure collagen solution into highly dense aligned threads [2]. Our mesh is made of electrocompacted collagen threads which are woven to form macroporous meshes which are then cross-linked in a 2% genipin solution.

Results

Meshes were mechanically robust enough to travel smoothly through the abdominal muscles without tearing during the procedure. All rats reacted well and survived until the planned time points. Histopathological evaluation:

Two weeks specimen: revealed excellent cellular infiltration, beginning of the healing response, focal chronic inflammation areas, neovascularization, tissue integration and granulation tissue deposition. No degradation was noticed.

One month specimen: revealed no inflammation with more neovascularization and tissue integration and new collagen deposition. No degradation was noticed at this point as well.

Six months specimen: revealed marked new collagen deposition with excellent tissue integration. Minimal degradation of the original material is noted.

Discussion

The most common slings are made from polypropylene; providing long-lasting mechanical support but erosions and extrusions are not uncommon. There are more than 40 slings on the market made from synthetic, autograft, allograft or xenograft materials which are used in SUI procedures. However, each maintains variable biocompatibility, some lack long term mechanical support and others present complications. Both material and design are affecting the fate of biomaterial. Our mesh showed early biocompatibility in the form of tissue integration and neovascularization with additional host collagen formation at one month that increased at six months.

Conclusion

Our novel mesh showed excellent biocompatibility and early tissue response in the form of neovascularization and tissue deposition at 2 weeks with the addition of new collagen formation at one month that increased at six months time point. These results are promising as they indicate potential for complete remodeling and recipient tissue replacement. More long-term histological and mechanical testing in animal models are needed to fully assess success of the mesh.

References


Disclosures

Funding: NONE Clinical Trial: No Subjects: ANIMAL Species: Rat Ethics Committee: Institutional Animal Care and Use Committee (IACUC)

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