538

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ALLOPLASTIC MATERIALS IN THE TREATMENT OF FEMALE URINARY STRESS INCONTINENCE AND PROLAPSE SURGERY – SALVATION OR COMPLICATION FOR CONCERNED PATIENTS?

Hypothesis / aims of study

More than 200 million female patients worldwide are affected by urinary incontinence (FUI). In the US only, therapy of FUI causes costs of around 16 billion US$/year [1]. The use of alloplastic materials for the reconstruction of pelvic floor disorders is commonly accepted and widely performed.

However, in Oct 2008, the Federal Drug Administration (FDA) issued a warning concerning serious complications associated with transvaginal placement of surgical mesh in the repair of pelvic organ prolapse (POP) and stress urinary incontinence (SUI) in more than 1000 women [2]. These complications (erosion through vaginal epithelium, infection, pain, urinary problems, recurrence of prolapse and/or incontinence, bowel, bladder, and blood vessel perforation during insertion, vaginal scarring and mesh erosion) have already been reported as rare events in earlier trials, but are likely to be under- diagnosed and under- reported [3].

Apart from short- term complications due to the surgical technique used long- term outcome and adverse events have not been evaluated yet as long-term results are still lacking. In particular, the acceptance of alloplastic materials on cellular level and presumable consequences (cicatrice formation and interference with surrounding functional tissue) on patients`quality of life (including female sexual dysfunction) remain unanswered questions.

To our knowledge preclinical research investigating the biocompatibility of such alloplastic materials has not been described so far. The aim of our study is to determine the interoperability of alloplastic materials in in- vitro experiments.

Study design, materials and methods

Meshs from 12 different manufacturers approved for the treatment of POP and SUI in females were taken for further investigation. The devices were brought together with human muscle derived cells and coincubated in commercially available medium. Cell growth and exact localisation of cell depositioning were observed. Samples containing medium plus cells without mesh material were taken as control.

Moreover, device samples were extracted from patients who had to undergo explantation of previously implanted mesh materials due to severe complications as mentioned above and histological reprocessing was carried out. The experimental procedures are performed according to § 4 AMG (German pharmaceutical law) and written consent of the patients acquired prior to tissue extraction.

Results

Cell cultivation was comparably successful in control as well as in all mesh- containing samples. In most samples accumulation of the muscle derived cells was limited to the bottom of the petri dishes. Mesh- related cell growth was observed on one of the 12 investigated devices only, i.e. cells were found that settled on the surface of the mesh and showed increasing proliferation on it.

Histological examination of explanted mesh devices revealed distinct scar formation and foreign body reactions characterised by the presence of numerous giant cells. The tissue surrounding the alloplastic material was completely non- vital.

Interpretation of results

Our preliminary results demonstrate that only one out of the 12 mesh devices seems to be compatible for colonisation of muscle derived cells. Regarding the other samples, cell growth is limited to the surface of the petri dishes indicating that cells refuse to settle and expand on alloplastic materials.

Histological examination of former in-vivo mesh graft samples attest the creation of considerable scar tissue surrounding the mesh and leading to complete devitalisation of the implantation area. This might be an important factor for the induction of reported symptoms such as pelvic pain, sexual dysfunction, persisting urinary incontinence and consecutive depression.

Concluding message

On the basis of the FDA warning, lacking long-term experience and the poor status of experimental approaches concerning behaviour of mesh grafts in-vivo further investigation is urgently needed to determine the role of alloplastic materials in the development of severe complications after implantation for the treatment of POP and FUI in females.

References

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Specify source of funding or grant	**The authors have nothing to disclose.**
Is this a clinical trial?	**No**
What were the subjects in the study?	**HUMAN**
Was this study approved by an ethics committee?	**No**
This study did not require eithics committee approval because	**the experimental approach follows §4a of the German Pharmaceutical Law (§4a AMG). This excludes the possibility of performing a clinical trial. An ethical approval is not required.**
Was the Declaration of Helsinki followed?	**Yes**

Was informed consent obtained from the patients?	**Yes**