Tilapia fish skin: A new biological graft used in neovaginoplasty

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Introduction

Neovaginoplasty is the surgical treatment for vaginal agenesis. It is necessary not only to open the canal, but also to cover it with some material that mimicked the vaginal mucosa. Many materials have already been used, such as amniotic membrane, peritoneum, sigmoid segment, autologous skin graft, etc. Neovaginoplasty with autologous skin graft is a surgery with good success rates, but had important drawbacks: too much invasiveness and complex with great surgical time, infections risk, and leave stigmatizing abdominal or inguinal scars. This research seeks an alternative to skin grafting with an easily accessible material in relation to cost. Due to the success in various works with the skin of Nile tilapia (Oreochromis niloticus) in burn patients. The Tilapia Fish Skin (TFS) would function as a scaffold at neovagina, it would therefore aim to provide structural integrity, guide the restructuring through the proliferation of the donor cells and in-growth of the host tissue. TFS presents dense fibrous connective tissue layer (collagen type 1) and it has mechanical similarity to human skin and to other available biomaterials.

Patients and Methods

TFS samples were obtained from fish farms on Castanhao (Jaguaribara-CE). Fish are raised in net pens and usually sacrificed when around 800 to 1000 grams. Skin samples were submitted to chemical sterilization consisting of two sequential baths in 2% chlorhexidine for 30 min, followed by sequential baths in 50, 75 and 99% glycerol. After the above mentioned chemical sterilization process, skins were individually packaged into double plastic envelopes and sent to the Nuclear Energy Research Institute in Sao Paulo (Instituto de Pesquisas Energeticas Nucleares-IPEN) where different samples were irradiated on a Cobalt 60 Multipurpose Irradiator, at 30 kGy.

In patients, a neovaginoplasty according to the “Mac-Indo” technique using TFS, was performed. Approval from the hospital’s Medical Ethical Committee and informed consent was obtained. Each of the patients exhibited primary amenorrhea and normal secondary sex characteristics. They all underwent a preoperative workup, including genetic evaluation, evaluation of the hormonal status, abdominal/vaginal sonoigraphy and MRI.

The surgeries ran without intercurrences in two patients with Müllerian agenesis (aged 17 and 21 years). The surgeon opens a neovagina, around 10 to 12 cm in length and 3 to 4 cm in diameter. TFS is sutured onto an acrylic mold in order to wear it. The patients evolved well after leaving the hospital in 48h and maintained her outpatient follow-up at 30, 60, 90 and 180 days after surgery. He used a silicone mold continuously (24 hours a day) for 3 consecutive months and then went on to use it only at night while sleeping. In the 90-day study, a vagina with a good length (> 10 cm) and half of its extension (right and posterior lateral wall) was observed vaginal tissue healed, smooth and without areas of erosion, infections or granulomas. Two vaginal biopsies were performed, without intercurrences.

Results

The histological study showed area of tissue organized with dense collagen, more evolved toward healing, a few epithelial cells were observed similarly to vaginal epithelium, without giant cells at any time. After 6 months of surgery, the patient was released for sexual intercourse. They did not present significant bleeding, only small and only the first time. There was one mucosal prolapse; there were no surgical, urinary, or gastrointestinal infections or complications. Follow-up will continue.

Conclusion

TFS can constitute a possible graft material similar to other xenografts. TFS is a safe biological material, with sterilization radiation techniques already described and effective in relation to virus extermination, widely available in our country. The possible future implementation of a novel biomaterial derived from the TFS would produce great technological advancement with significant financial and social impact for the health system.