ABSTRACT

Title of the Abstract: Muscle derived stem cells in the treatment of anal sphincter injury in a rat model – An interventional study

Department: General Surgery

Name of the Candidate: Dr. Sasank K

Degree and Subject: MS (General Surgery)

Name of the Guide: Dr. Sukria Nayak

Objectives:

1. To standardize a rat animal model of anal sphincter injury using functional and histological parameters
2. Quantification of the anal sphincter contractility at baseline, after injury and after injection of stem cells
3. Histological examination of the anal sphincter to look for structural regeneration of the sphincter muscle fibres

Methods:

A prospective cohort study was designed using two arms – control and test arm. The baseline manometry and anal sphincter contractility were measured for all rats, following which the rats underwent partial sphincter excision. The manometry was repeated in all the rats after the injury to demonstrate anal sphincter insufficiency. The stem cells were harvested from the hind limb muscle of the same animals in the test group under the same anaesthesia. Muscle derived stem cells were isolated from the muscle sample and then injected back into the anal sphincter after allowing adequate wound healing. The control rats received a placebo injection of phosphate buffered saline. All animals were followed up at a mean follow up of 5 weeks and underwent an anal manometry, following which they were sacrificed and their anal sphincter complex was subjected to histopathological examination.

Results:

A total of 11 animals were included in the study – 5 in the test arm and 6 in the control arm. All animals tolerated the procedure well. The hind limb muscle biopsy was a good source to isolate satellite cells. The anal manometry of both the control and test arm animals reached normal values by 1 month follow up. However, on histopathological examination, there was unorganised muscle in the area of defect in the animals injected with stem cells while there was predominantly fibrosis in the defect in animals injected with only phosphate-buffered saline.