

MRI OF PRIMIPAROUS SQUIRREL MONKEYS DEMONSTRATE PELVIC FLOOR MUSCLE AND SUPPORT CHANGES.

Hypothesis / aims of study

Serial magnetic resonance imaging was used to test whether pelvic muscle volumes and pelvic organ support are altered by parturition and recovery in female squirrel monkeys undergoing their first delivery.

Study design, materials and methods

Levator ani, obturator internus, and coccygeous muscle volumes were obtained from serial gradient echo axial images from 8 squirrel monkey females prior to pregnancy, three days after first delivery, and four months post-partum and were measured. Positions of bladder neck and cervix relative to bony landmarks were measured using a dynamic process that used abdominal squeezing during MRI at the same time points. Positions and volumes were compared using analysis of variance with repeat measures to identify effects related to parturition and recovery on pelvic floor muscles.

Results

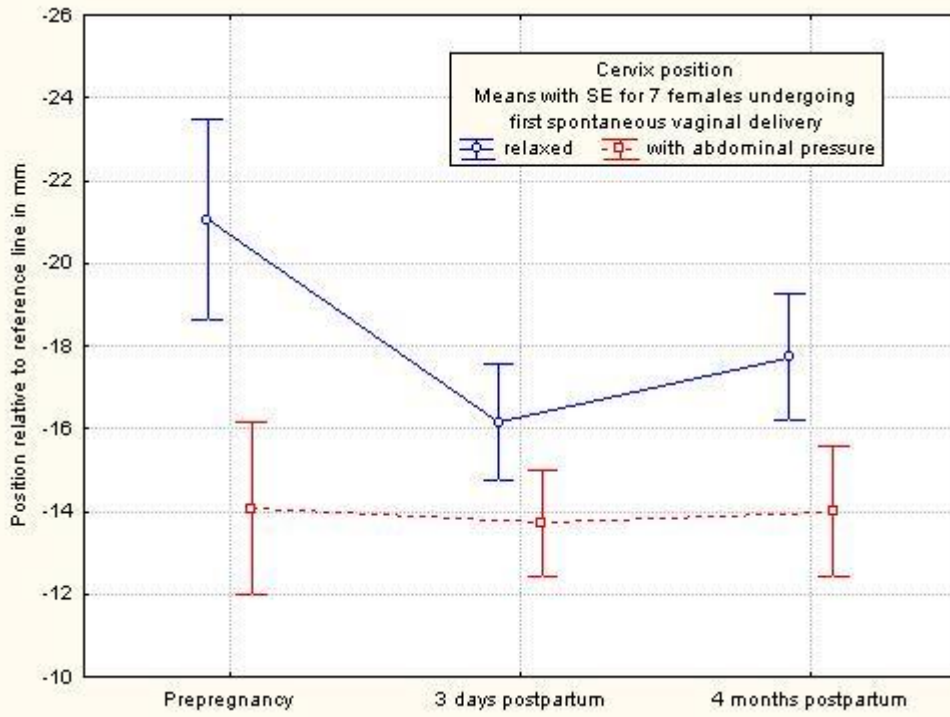
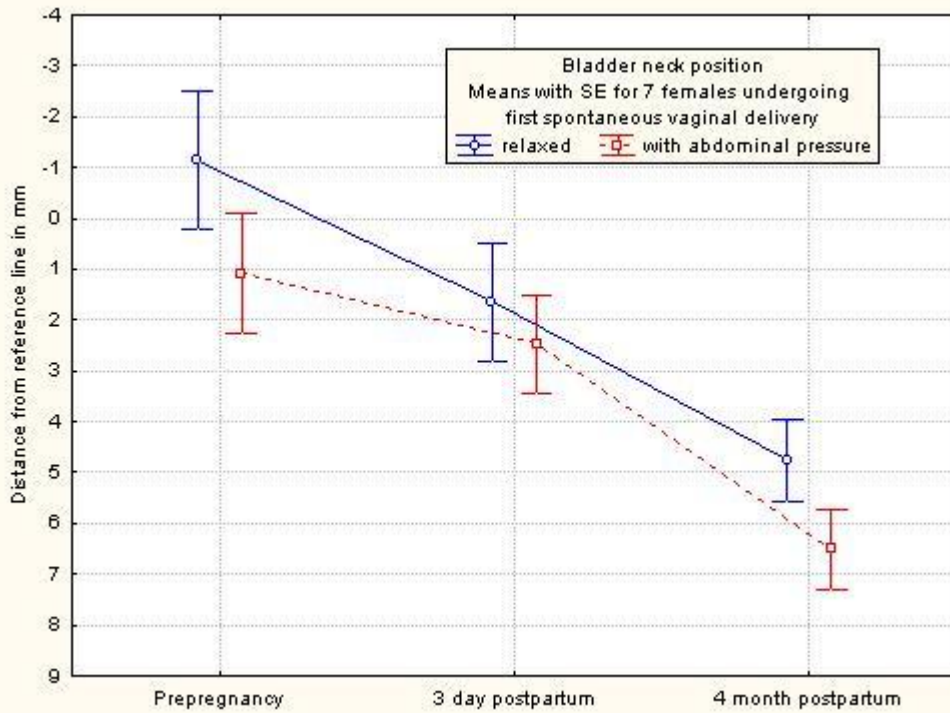
One of 8 females required c-section for malposition, therefore analyses were based on 7 animals with spontaneous vaginal delivery. The volumes of left and right sides for the three pairs of muscles did not vary ($p > 0.66$) at any time points. Coccygeous muscle volumes were significantly ($p < 0.004$) greater immediately after parturition than either before pregnancy or after recovery. There were significant ($p < 0.02$) changes in the percent of high contrast regions within the coccygeus muscles immediately after delivery that was only partially corrected by four months post partum. Bladder neck position descended significantly ($p < 0.04$) relative to a bony reference line both in the relaxed state and with abdominal pressure following vaginal delivery and it descended further ($p < 0.001$) by 4 months postpartum. Abdominal pressure also produced significant descent ($p = 0.008$) relative to the relaxed state. The position of the cervix with abdominal pressure was unchanged ($p = 0.50$) among times. However, the position of the cervix in the relax state was significantly ($p < 0.001$) higher than immediately postpartum or after 4 months recovery.

Interpretation of results

Levator ani and obturator internus muscles were not changed in relation to the first pregnancy in a cohort of squirrel monkeys while the coccygeous muscles were seen to increase in contrast and volume. Bladder neck position also descended after the first vaginal delivery.

Concluding message

The coccygeous muscle is affected by parturition in the squirrel monkey by evidence of increased contrast in serial MRI images while obturator internus and levator ani muscles are only minimally altered as the result of a single delivery. Pelvic organ support is also affected by parturition in the squirrel monkey by evidence of bladder neck and cervical descent from a bony reference line on serial MRI images.



Specify source of funding or grant	Noble Centennial Endowment
Is this a clinical trial?	No
What were the subjects in the study?	ANIMAL
Were guidelines for care and use of laboratory animals followed or ethical committee approval obtained?	Yes
Name of ethics committee	Scott and White Institution of Animal Care and Use Committee