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RESEARCH ARTICLE

SEMEN PROFILE OF LANGUR MONKEYS PRE AND POST VASECTOMY AND VASOVASOSTOMY

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Abstract

The study was planned to observe the effects of long term (24 months) vasectomy on seminal characteristics in langur monkeys and do they have any role in the failure of reanastomosis. Sham operated animals seminal parameters did not show any alterations. Whereas vasectomized animals semen volume, weight, citric acid, magnesium, LDH and GPC showed gradual decline. Semen pH, fructose and acid phosphatase did not show any appreciable change. Altered parameters recovered following 3-6 months of vasovasostomy . The study did not find any significant effect on testicular or sex accessory gland secretions which may be responsible for infertility after vasovasostomy.

INTRODUCTION

When one look for a simple, safe, quick and permanent method of male contraception the only answer still comes is vasectomy. The only drawback lying with it is of reversibility success which cannot be guaranteed. Despite effective microsurgery, reanastomosis is functionally less successful. The exact causes for the reduced success rate in reanastomosis are still unknown.

How far sex accessory gland is affected is also a matter of contradiction. Hence, the aim of the present study was to find out the changes in seminal characteristics following vasectomy and whether they have any role in failure of vasovasostomy.

Alterations observed in seminal characteristics and semen biochemical parameters following vasectomy recovered following 3-6 months of reanastomosis. Hence the study concludes no effect of vasectomy on sex accessory gland secretions which play role in infertility after vasovasostomy.

OBJECTIVE

The aim of the study was to investigate the changes in seminal characteristics following vasectomy and whether they have any role in failure of reanastomosis.

EXPERIMENTAL ANIMALS

Adult male langurs(Presbytis entellus entellus Dufresene) were used in the study as they have close resemblance to human in their endocrine and exocrine profile and lack of seasonality provides an opportunity for conducting long term investigations(lohiya et al., 1983). The study was approved by the institutional ethical committee. Indian national Science Academy (INSA, 1992) guidelines were followed for maintenance and use of experimental animals.

EXPERIMENTAL DESIGN

The study was planned by dividing animals into three groups as follows:
Group I: Sham Operated control
Group II: Vasectomized animals (24 months)
Group III: Vasovasostomized animals (12 months)

Surgery
Sham Operations: Three animals were sham operated. It involved immobilization of vas without cutting and ligating the vas.

Vasectomy: Bilateral vasectomy was performed in 6 six adult langurs under sterile conditions. Vas deferens of both side were exposed and a piece of 0.5 – 1 cm was removed from each side of vas.

Vasovasostomy
Vasovasostomy was performed in three vasectomized animals using the microsurgical two layer anastomosis after completion of 18 months of vasectomy.
Entire surgery was performed under the supervision of a clinician.

Study Parameters
Semen Analysis
Semen samples were collected prior to, and following vasectomy at 7, 15, 21 and 30 days after that every three months from conscious monkeys by penile electroejaculation (Mastroianni & Manson, 1963) to study seminal characteristics and seminal biochemistry.

Seminal Characteristics
Semen was analyzed for its colour, pH, volume, weight and coagulum and fluid volume. Microscopically semen was analyzed for sperm motility, sperm density, viability and sperm morphology. (WHO, 1987)

Seminal plasma Biochemistry
Semen samples were allowed to liquefy at room temperature for 15 to 20 minutes and then centrifuged at 3000RPM for 30 min. seminal plasma separated and stored at -20^0 C in small aliquots till analysis. Seminal plasma concentration of fructose (Mann, 1964), acid phosphatase (Gutman & Gutman, 1940) magnesium (Neill &Neely, 1956) citric acid (Lindner & Mann, 1960), lactic dehydrogenase (Cabaud&Wroblewski, 1958) and Glycerylphosphorylcholine (White, 1959) were estimated.

RESULTS

Sham Operated Animals
Sham operated animals resembled exactly the unoperated control in their seminal characteristics.

Vasectomized animals
Semen volume and weight decreased transitionally during one to six months of vasectomy and then showed an increasing trend. (Fig.1, 2)

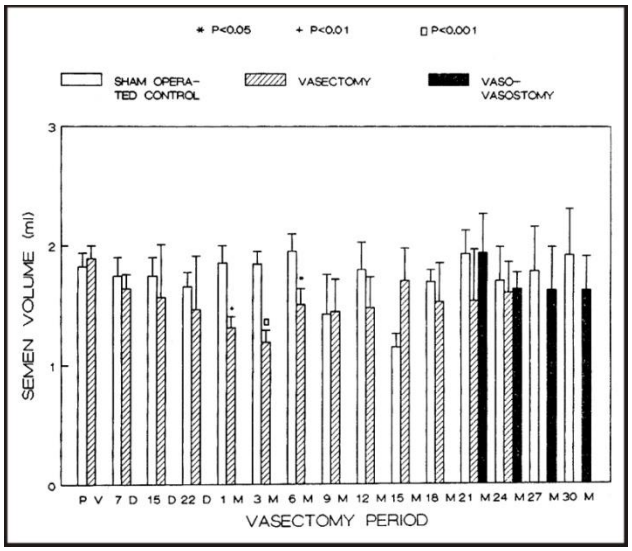

Fig.1: Note the transitional decrease and increase in semen volume following 3 months of vasectomy and 3 months of vasovasostomy respectively. Values are expressed as mean + S.E.

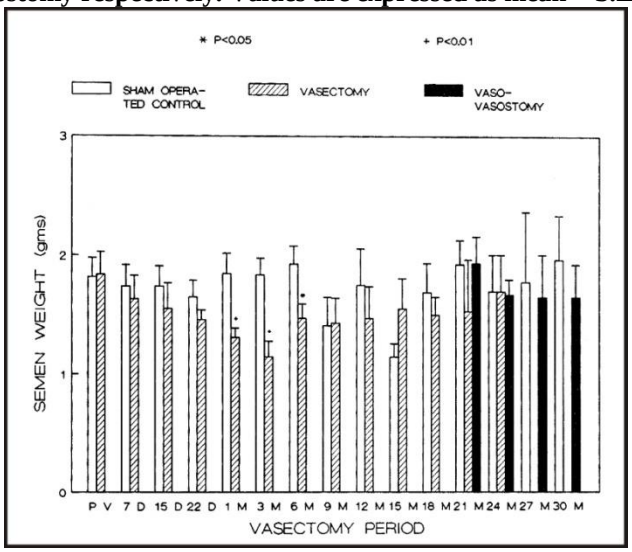

Fig.2: Effect of vasectomy and vasovasostomy on weight of semen. A transitional decrease in semen weight was observed for 6 months of vasectomy which recovered to normal following 3 months of vasovasostomy.

Microscopic studies revealed no motile sperms after 15 days of vasectomy and a rapid decrease in the number of sperms was observed following 4 ejaculations after surgery.(Fig.3)

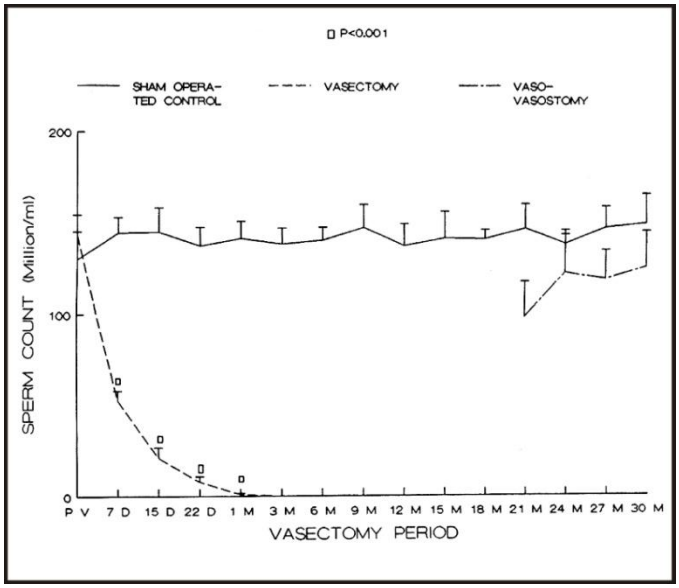

Fig.3: The rate of the disappearance and reappearance of the sperms from and in the ejaculate following vasectomy and vasovasostomy respectively in langur monkeys. Perfect azoospermia was achieved following 30 days (1 month) of vasectomy. Normal sperm count was achieved following three months of vasovasostomy

Semen pH was found to be unaltered through out the study period.The seminal fructose and acid phosphatase did not show any appreciable change following vasectomy.(Fig.4,5)

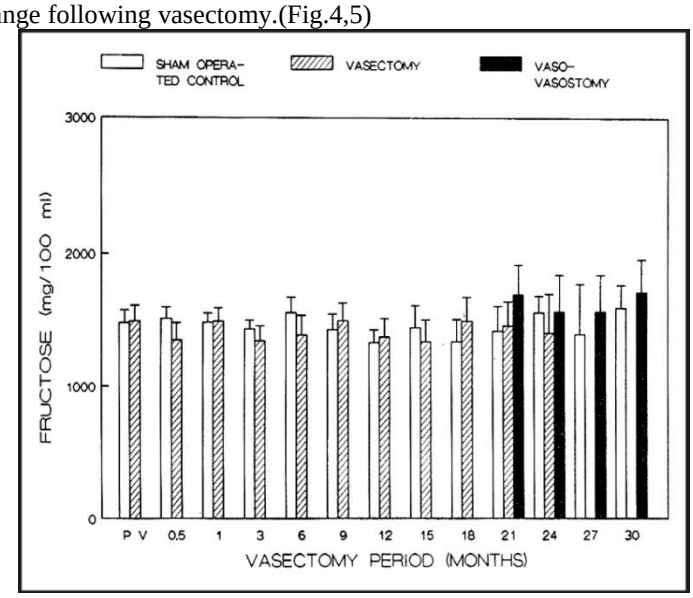

Fig.4: Effect of vasectomy and vasovasostomy on fructose concentration of seminal plasma in langur monkeys. No significant alteration was observed in these values at any interval when compared with sham operated control. Values are expressed as mean + S.E.

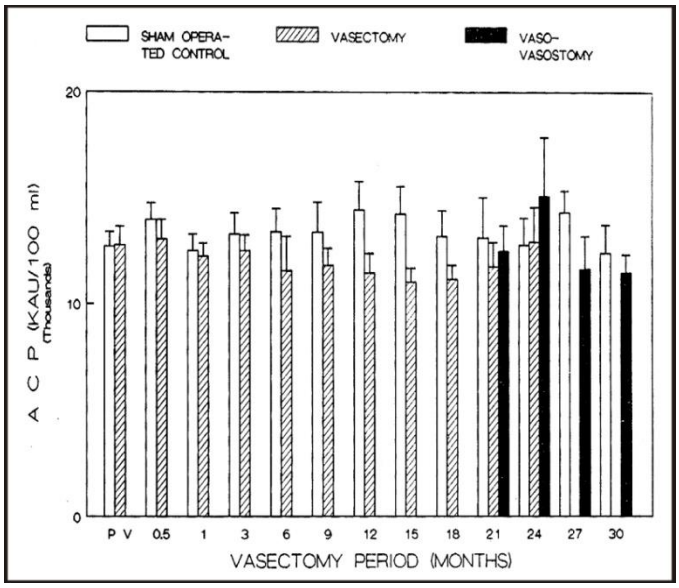

Fig.5: No significant alteration was observed in acid phosphatase (ACP) concentration of seminal plasma following vasectomy and vasovasostomy when compared with sham operated control. Values are expressed as mean + S.E.

Citric acid (Fig.6) and magnesium (Fig.7) showed significant decline throughout the study period of vasectomy when compared with sham operated control.

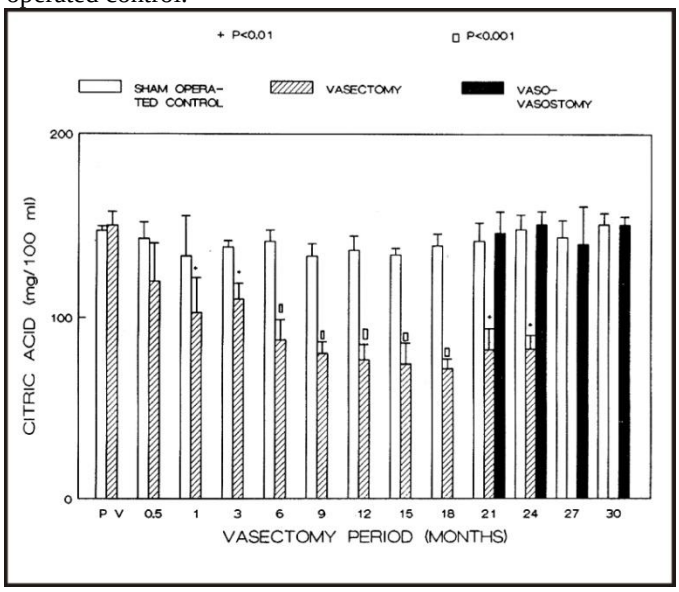

Fig.6: Effect of vasectomy on citric acid concentration of seminal plasma following vasectomy and vasovasostomy. A significant decline was observed following vasectomy but the declined value increased following 3 months of vasovasostomy when compared with sham operated control. Values are expressed as mean + S.E.

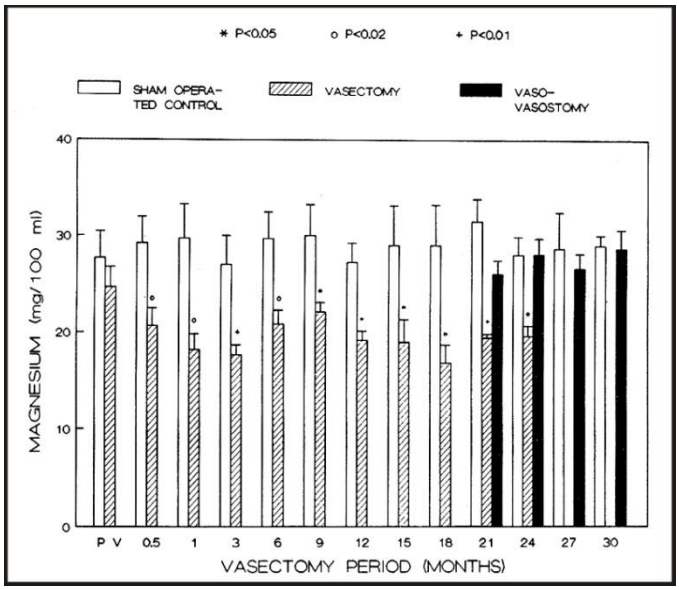

Fig.7: Significant decline in magnesium concentration of seminal plasma from sham operated control following vasectomy which recovered to normal following vasovasostomy. Values are expressed as mean + S.E.

LDH showed decline upto 9 months of vasectomy and then fluctuated within same the range upto 24 months of vasectomy.(Fig.8) GPC decreased significantly following 0.5 month to entire duration of vasectomy.(Fig.9)

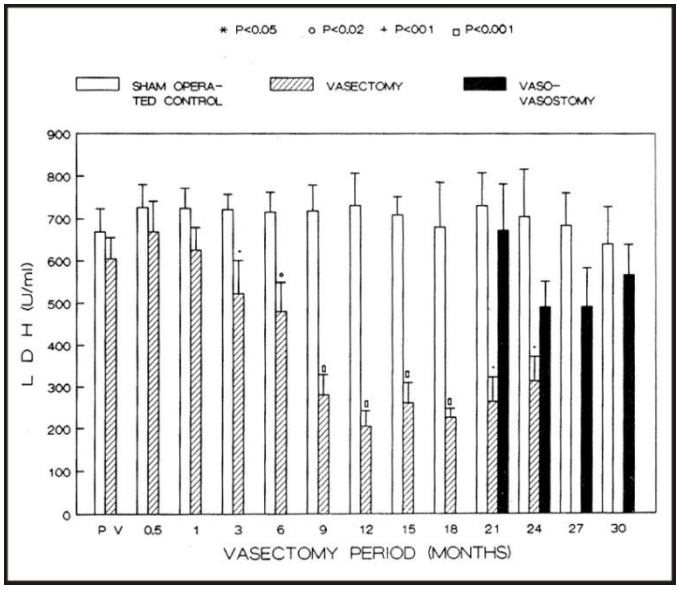

Fig.8: Effect of vasectomy and vasovasostomy on lactic dehydrogenase (LDH) of seminal plasma. Values differ significantly following vasectomy but recovered to normal following three months of vasovasostomy. Values are expressed as mean + S.E.

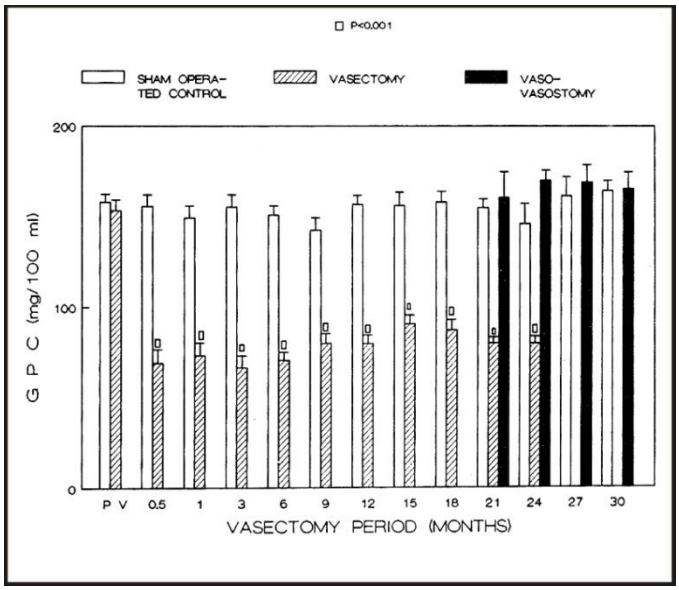

Fig.9: Effect of vasectomy on seminal plasma concentration of glyceryl phosphorylcholine (GPC) indicative of epididymal functon in langur monkeys. The values declined significantly following vasectomy and recovered following vasovasostomy when compared with sham operated control. Values are expressed as mean + S.E.

Vasovasostomized animals

Seminal characteristics showed complete recovery following 3-6 months of vasovasostomy.

The citric acid, magnesium, LDH and GPC returned to normal levels following 3 to 12 months of vasovasostomy.

DISCCUSSION

At the time of vasectomy the entire reproductive tract contains sperms. The time required for complete elimination of sperms from the ejaculate following vasectomy varies from species to species. Perfect azoospermia is the standard employed for the efficiency of the procedures.

We did not observe motile sperms in the ejaculate of 15 days vasectomized monkeys.

Similarly seminal pH also remains unaltered. No change in the seminal pH suggests an unaltered hydrogen ion concentration of semen following vasectomy as Mathur (1984) in rabbits Chatterjee et al., (1976) in dog also did not observed any change in seminal pH.

Vasectomy resulted into significant decline in semen volume of men (Jouannet & David, 1978, Joshi, 1981, Medappa, 1981). Semen weight and volume gradually decreased for 4 months in vasectomized langur monkeys in present investigaton and then showed in increasing trend.

Semen consists of secretions from testis and accessory sex organs, with the major parts of seminal plasma being contributed by seminal vesicle and prostate gland.

Fructose and acid phosphatase being the main constituent of the seminal plasma secreted by the seminal vesicle gland (Mann, 1964), did not show any alterations in the present investigation as also reported by Gregoire & Moran,(1972) Nun et al.,(1972) Thakur et al., (1975) Naik 1978 & Medappa (1981). Mannivannan et al., (2005) also observed no significant alternation in seminal fructose and acid phosphatase in vasoccluded monkeys by styrene maleic anhydride. Ajmera (1980) observed a non significant decrease in fructose and ACP in men indicating an altered seminal vesicle function and/or some subclinical secondary vesiculities following vasectomy. Contrary an elevated fructose was also reported in vasectomized men by Das & Roy 1971 and Kothari et al., 1971)

Citric acid (Medappa, 1981) and Mg (Elliason & lindholmer 1972) is prostatic in origin. Our observation of transitional decrease in citric acid and magnesium level was in agreement with the studies of Naik et al (1978, 1980)

Ajmera (1980) Joshi(1981) & Medappa (1981) in one week to eight years vasectomized men indicating suppressed prostatic activity following vasectomy.

Lactctic dehydorgenase (LDH) contributed by prostate gland in semen (Macleod &Wroblewski, (1958) showed a decline in langur monkeys due to absence of spermatozoa, hence no contribution of LDH from spermatozoa to seminal plasma. It may also be due to lack of direct contribution of LDH by the testis to the seminal plasma, diminished secretion of LDH enzymes due to decreased prostatic function. Non significant decline were observed by Gregoire & Moran (1972) whereas, Jimenez et al (1998) reports no statistically significant difference in vasectomized non vasectomizes groups of man.
GPC/mainly contributed by epididymis (Frankel et al 1974, Calamara and Lavieri 1979) showed a significant decline in the present study suggesting that the main source of GPC is epididymis. Medappa (1981) Naik et al., (1978) also found a significant decrease in GPC is vasectomised monkeys.

Tests following vasovasostomy showed a return to normal levels of seminal volume, citric acid, LDH, Mg and GPC within 3-12 months of renastomosis emphasizing that prostatic function which suppress due to vasectomy improved to normal after reanastomosis which is in accordance with present finding in langur monkeys .(Joshi 1981, Medappa 1981)

CONCLUSION

The present study concludes that the vasectomy does not lead to any significant effect on testicular or sex accessory gland secretions which will be responsible for infertility after vasovasostomy without altering general body metabolism in langur monkeys.

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