REVIEW OF LITERATURE
REVIEW OF LITERATURE

Vasectomy, a simple procedure, designed to block the passage of sperms through the vas deferens, was not understood until the 19th century and was not performed as a method of voluntary fertility control until the 20th century. An early reference to vas occlusion was made by the English Surgeon and anatomist JOHN HUNTER in 1775. While performing a dissection, HUNTER noted an obstructed vas deferens in the cadaver on which he was working. In 1830 HUNTER’S student Sir Astley Cooper began an experimental work on vasectomy using dog. He ligated the artery and vein of spermatic cord on one side without touching the vas; on the other side, he ligated the vas itself. On the side where the artery and vein were obstructed, the testes became gangrenous. On the side where only the vas was obstructed, the tissue remained healthy and sperms survived in the ductal tract up to the point of ligation. The epididymis, or the convoluted portion of the vas, gradually enlarged to accommodate the sperms.

In 1885 FELIX GUYON, a French Surgeon, concluded that blocking the vas caused atrophy of
the prostate gland. This finding encouraged genito-
urinary surgeons of the 1890's to perform vasectomies
concurrently with prostate operations in order to
reduce the size of the gland and to avoid post-
operative epididymitis. One of the first operations
is credited to Dr. H. G. Lennander of Upsala, SWEDEN,
who in 1897 published a report on his technique.

Dr. Harry Sharp of Indian (U.S.A.)
reported performing a vasectomy in 1899 on a mentally
ill patient whose complaint was excessive mastur-
bation. The patient consented to the operation,
believing that it would relieve his obsession. The
results, undoubtedly psychological, were favourable.
In the next ten years, Sharp performed 456 voluntary
vasectomies on both healthy and institutionalized
men for the purpose of sterilization.

In the early 20th century, vasectomies
were, some times, carried out for eugenic reasons on
criminals, the mentally ill, the retarded, or those
with hereditary diseases. Paradoxically, even as its
contraceptive effects were being documented, the
operation was performed by Eugene Steinach, an
Austrian exile, for the purpose of over all bodily
rejuvenation. From his experiments on rats,
Steinach determined that following ligation of the vas, the sperm producing tissue degenerated while at the same time there was hypertrophy of the hormone producing tissue, which, in its turn, caused renewed germ cell production. This process was originally thought to counter the effects of aging. Later, Steinach's hypothesis was refuted, but doctors and scientists continued to advocate the operation for contraceptive purposes.

As national family planning programmes were initiated in South Asia in the 1950's and 1960's, vasectomies filled the obvious need for a simple, inexpensive birth control technique that could be offered on a one-time basis.

Although the number of vasectomies performed throughout the world fluctuates from year to year depending on publicity, national budgets or programme guidelines, the simple procedure of vasectomy has clearly taken its place as a major technique in voluntary family planning.

In usually practiced method of vasectomy, an incision is made, the vas deferens is exposed, cut, ligated at both ends and then the skin is sutured. The patient has to come for stitch removal after
seven days. But there are many complications due to open exposure – ligation of the vas deferens. Post-operative infection, haematoma, discoloration, swelling, pain, sperm granuloma, epididymitis and psychological effects of an operation and sinus formation occasionally occur. Open method also requires equipment like knife, blade, suture materials, artery forceps etc.

As vas deferens can easily be felt and held through skin, some persons tried to block the vas blindly without making any skin incision. G.S.Sekhon (1970) developed an instrument for percutaneous vasectomy, which encircled the vas and diathermy snare wire was introduced through a special needle. He divided vas as single, double and triple cut. Instead of diathermy division, the vas may be prolapsed through a small stab wound using another new instrument – a skin protector in conjunction with vasectomy. In contrast to the single cut technique, all the other methods appeared to be quite satisfactory in achieving the objective. The chances of injury to the testicular – artery by the blind diathermy technique must be quite rare, because, the testicular artery is located a little farther away from the vas, with a separate leash of veins in
pampiniform plexus. Even if worst comes to worst, still the testicular atrophy need not follow, because of a rich collateral circulation (Koontz 1965).

According to Schmidt et al (1974), fulguration of the lumen of the vas deferens is the optimal method of sealing the cut ends of the vas at vasectomy. Minimum spermatic granulomas have followed in over 1600 cases. However, standard types of electro-surgical units may destroy the full thickness of the vas-wall with resulting complications. A unit has been designed with a power source of a single 22.5 volt dry battery. A bipolar needle is used, so grounding of the patient is unnecessary. Several hundred vasectomies can be done before renewing the battery. Complete destruction of the epithelial layer is obtained with little damage to muscular wall. Neither spermatic granuloma nor failures have resulted.
MATERIAL AND METHOD
MATERIALS AND METHOD

Preparation of insulated cataract knife:
Insulation of cataract knife was done by using a well known dental material, stellon cold cure acrylic resin powder and liquid.

A cataract knife (Narrow Von Graebe Knife) was coated with cold curing dental compound which consisted of stellon cold cure acrylic resin powder and liquid. A paste was made and painted over the blade of knife except at its' tip. After setting for five minutes, the excess was removed by sand paper, so that only a thin layer remained and the layer was made tapering, so that it could easily penetrate through the skin.

Sterilization of insulated cataract knife:
Various methods like boiling, autoclaving, chemical sterilization by spirit, lysol and savlon were tried for sterilization of knife. Ultimately cidex (R) which consists of 2% glutaraldehyde with activator was selected for sterilization for 15 minutes, was found to be most suitable as it did not damage the insulated coating of the knife.

Percutaneous fixation of vas
The vas was fixed in this study using a
towel clip. The sterilization of the instrument was done either by boiling or by autoclaving.

**Electro Suralcal Cautery**

An electro surgical cautery was used to cauterize the vas and to coagulate the ends.

**Patients**:

The study was carried out on 8 patients of benign prostatic hyperplasia (group 1) not associated with diseases like hernia or hydrocele etc. admitted to the hospital for definitive surgery as vasectomy is preliminary requirement for prostate removal. After having standardized the technique this procedure was used for vas occlusion on 14 healthy men (group 2) who volunteered for permanent fertility control. Ten healthy men similarly volunteering for permanent fertility control were subjected to standard open vasectomy (group 3).

**Preoperative preparation**

The informed consent was obtained in each case. The part was prepared by shaving the area. Lignocaine sensitivity was determined. Anti tetanus immunization was also done and the patient was shifted to operation theatre.

**Operative Procedure**

Complete aseptic techniques were used.
The part was cleaned and draped. Infiltration by 1% lignocain hydrochloride was used as local anaesthetic. In some cases, along with local anaesthesia, diazepam (10 mg) and pentazocine (30 mg) was also administered intravenously very slowly. Immediately patient went to sleep and did not feel any pain during the procedure.

The Technique

The vas was palpated and brought to the surface between thumb and fingers. The local anaesthesia was infiltrated on the upper end of vas and it was fixed using a towel clip. The towel clip was first opened and then the grip was taken on the skin by it so that vas was held by it in it's tip. Now the lignocain was similarly injected (1 cc) on the lower end of the vas which was also fixed using a towel clip.

Now an area was infiltrated by lignocain in between the two towel clips. The insulated cataract knife was inserted into the skin so that its' sharp edge faced upward. The tip of the blade was brought under the vas. Vas was pressed upon it's sharp edge. Now the cautery was applied through the cataract knife (a high frequency current of very short duration) and thus the vas was cauterized and cut, which was clearly felt (the two ends were felt separately). The cut ends of vas retracted and
gap between two ends was about 2.5 cm. The cataract
knife was removed and the area was sealed by tincture
benzoin. No dressing was applied. Similar procedure
was carried out on the opposite side.

Post operative treatment:

Patients were given only analgesic
tablets for 1 to 2 days. No antibiotics were needed
routinely. The patients were followed for pain, tender-
ness, haematoma, swelling, pus formation fever and
epididymo-orchitis, for 5 to 7 days.

At the time of definitive surgery for
benign prostatic hypertrophy, just before doing
prostatectomy, vas was exposed through longitudinal
incision over the scrotum. The cauterized ends of vas
were dissected and the upper and lower ends of vas,
were removed. Similar procedure was carried out on
opposite side. The wound was sutured and sealed with
tincture benzoin before starting prostatectomy in
order to avoid contamination of wound by urine.

Methylene blue was injected through one
end of the removed vas to see the patency of cauterized
ends. Histopathology was done of all vas segments thus
removed.
The same technique was used for patients who came for voluntary vasectomy to this hospital. A proforma was prepared which enlisted full details of the patient (appendix 1). Under local anaesthesia, vas was cut and cauterized. The patients were sent home on the same day and were advised to use analgesics for 1 to 2 days. Post operatively patients were called daily for follow up for pain, tenderness, swelling, haematoma, pus formation or fewer and epididymo-orchitis for 5 to 7 days. Post operatively semen examination was done after 2, 4, 6, 8 and 12 weeks. Condomes were supplied for 3 months and patients were instructed not to indulge in sexual intercourse without condoms till instructed otherwise.

**Method for open vasectomy**

The method of open vasectomy was employed in patients coming for vasectomy who had associated scrotal pathology e.g. Hydrocoele, varicocele, hernia etc. and who were not considered fit for percutaneous vas fulguration.

The preoperative preparation was same as in percutaneous vas fulguration. The procedure was carried out using full aseptic techniques. The part was cleansed and draped. For anaesthesia, only local infiltration with 1% lignocaine hydrochloride was used.
The spermatic cord was palpated and vas isolated between thumb and index finger. Local infiltration of 1% lignocain hydrochloride on the skin of scrotum was done. An incision was made over the skin. The vas was held in Allis forceps and incision over it was made, to cut fascial layers. After clearing the vas from fascial layers for about 2.5 cm the vas was held using an artery forceps, cut and ends ligated with fine silk. A small segment of vas was removed. The spermatic cord was again placed in the wound and one or two stitches were applied on skin after complete haemostasis was achieved.

Postoperative management

The patients returned to bed. Some antibiotic and analgesics were given for 5 to 7 days. The patients were looked after for pain, tenderness, haematoma or swelling pus formation, fever and epididymo-orchitis. The stitches were removed after 7 days.

Post operative, seminograms were done after 2, 4, 6, 8 and 12 weeks. Condoms were supplied for 3 months and patients were instructed not to indulge in sexual intercourse without condoms till instructed otherwise.
**Fig 1**

Showing instrument used in percutaneous fulguration of vas

a. Narrow Von Graefe Knife
b,c. Insulated Narrow Von Graefe Knife
da. e. Towel clips

**Fig 2**

Showing electro-surgical cautery, 1% lignocaine in syringe, insulated cataract knife (two)

Towel clips (two)
Fig-3

Showing fixation of vas by towel clips

Fig-4

Showing infiltration of lignocaine 1% into the skin in between the towel clips
Fig. 5

Showing insulated cautered knife inserted into scrotum & placed under vas.

Fig. 6

Showing cutting & cannulization of vas by electro surgical cautery.
Fig-7
Showing Skin of Scrotum after Percutaneous Fulguration of Vas

OPEN VASECTOMY

Fig-8
Showing Isolated Vas from Spermic Cord
Fig-9
Showing vas in between artery forcep

Fig-10
Showing ends of vas in artery forcep after removal of small segment
**Fig-11**

Showing ligated ends of vas by non absorbable suture material.

**Fig-12**

Showing skin of scrotum after open vasectomy.
OBSERVATION
OBSERVATIONS

This procedure was carried out first in patients of Benign prostatic hypertrophy admitted to this hospital for prostatectomy. The study was done in 8 patients admitted from 1st May, 1982 to 31 March, 1983. During the same period percutaneous vas fulguration was done on 14 patients coming for voluntary vasectomies to this hospital.

Table No. 1

Showing age distribution of patients of Benign prostatic hypertrophy undergoing percutaneous fulguration of vas.

<table>
<thead>
<tr>
<th>Age group (Years)</th>
<th>Number of the patients</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 - 55</td>
<td>1</td>
<td>12.5</td>
</tr>
<tr>
<td>55 - 60</td>
<td>2</td>
<td>25</td>
</tr>
<tr>
<td>60 - 65</td>
<td>3</td>
<td>37.5</td>
</tr>
<tr>
<td>65 - 70</td>
<td>1</td>
<td>12.5</td>
</tr>
<tr>
<td>70 - 75</td>
<td>1</td>
<td>12.5</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>100</td>
</tr>
</tbody>
</table>

The maximum number of patients of benign prostatic hyperplasia subjected to fulguration of vas were in the age group 60 to 65 years and constituted 37.5% of all cases.
Table No. 2

Showing the age incidence of patients under going percutaneous fulguration of vas as a method of permanent fertility control.

<table>
<thead>
<tr>
<th>Age (Years)</th>
<th>Number of patients</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 - 30</td>
<td>3</td>
<td>21.42</td>
</tr>
<tr>
<td>30 - 40</td>
<td>9</td>
<td>64.23</td>
</tr>
<tr>
<td>40 - 50</td>
<td>2</td>
<td>14.28</td>
</tr>
<tr>
<td>Total</td>
<td>14</td>
<td>100</td>
</tr>
</tbody>
</table>

The maximum number of patients under going percutaneous fulguration of vas as a method of permanent fertility control were in age group 30 to 40 years constituting 64.23% cases in age group 40 to 50 years constituted only 14.28%.
Table No. 3

Showing the findings at the time of exposure of vas deferens before starting definitive prostatectomy.

Total number of patients - 8.

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Finding at the exposure of vas</th>
<th>Number of patients</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (a)</td>
<td>Complete division of vas deferens on right side</td>
<td>7</td>
<td>87.5</td>
</tr>
<tr>
<td>(b)</td>
<td>Complete division of vas deferens on left side</td>
<td>8</td>
<td>100</td>
</tr>
<tr>
<td>2</td>
<td>Cauterization of ends of vas (No leakage of saline from cauterized end)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a)</td>
<td>Right side upper end</td>
<td>1</td>
<td>12.5</td>
</tr>
<tr>
<td>(b)</td>
<td>Right side lower end</td>
<td>1</td>
<td>12.5</td>
</tr>
<tr>
<td>(c)</td>
<td>Left side upper end</td>
<td>1</td>
<td>12.5</td>
</tr>
<tr>
<td>(d)</td>
<td>Left side lower end</td>
<td>1</td>
<td>12.5</td>
</tr>
</tbody>
</table>

There was complete division of vas on left side leading to 100% results while on right side results were 87.5%. On exposure of vas bilaterally vas were found completely divided in all cases, except one, where vas on right side was found undivided.

When saline was injected, the cut ends of vas were found patent in 7 cases and blocked in one case only.
Histopathology

Histopathological examination of the resected segment of vas showed hyalinization and fibrosis of the wall. The epithelium lining of the lumen of the vas showed marked proliferation and multilayering of the cell resulting in marked narrowing and occlusion of the lumen. Moderate mono nuclear inflammatory reaction was also seen around the vas.
Table No.4

Showing the complications following fulguration of vas deferens. Total number of cases - 22.

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Complication</th>
<th>Number of patients</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Haematoma</td>
<td>1</td>
<td>4.54%</td>
</tr>
<tr>
<td>2.</td>
<td>Infections</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>3.</td>
<td>Epididymo-orchitis</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>4.</td>
<td>Ulceration of skin</td>
<td>2</td>
<td>9.08%</td>
</tr>
<tr>
<td>5.</td>
<td>Failure</td>
<td>1</td>
<td>4.54%</td>
</tr>
</tbody>
</table>

It is obvious from the table No.4 that out of 22 cases 1 patient got haematoma, constituting 4.54% and two patients got ulceration of skin i.e. 9.08%. There was only one case in which vas was neither cut nor cauterised on its right side i.e. chances of failure is 4.54%.

In cases, who came for voluntary sterilization and in whom percutaneous fulguration was done, nodule formation on each side of scrotum was noted after 15 days and it persisted up to 3 months in cases followed. Two nodules were felt on each side near to each other presumably on the cut ends of the vas and made up of organised fibrous tissue. As all the patients became azoospermic presumably fibrous tissue nodules blocked the ends of the vas completely.
Table No. 5

Showing the sperm count at 2, 4, 6, 8 and 12 weeks, after percutaneous fulguration of vas (Number of patients = 14).

<table>
<thead>
<tr>
<th>Sperm count</th>
<th>2 weeks</th>
<th>4 weeks</th>
<th>6 weeks</th>
<th>8 weeks</th>
<th>12 weeks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. of patients (%)</td>
<td>No. of patients (%)</td>
<td>No. of patients (%)</td>
<td>No. of patients (%)</td>
<td>No. of patients (%)</td>
</tr>
<tr>
<td>Normal count</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Oligospermia</td>
<td>10 (71.42)</td>
<td>6 (42.84)</td>
<td>1 (7.14)</td>
<td>1 (7.14)</td>
<td>1* (7.14)</td>
</tr>
<tr>
<td>Azoospermia</td>
<td>4 (28.58)</td>
<td>3 (57.16)</td>
<td>13 (92.86)</td>
<td>13 (92.86)</td>
<td>13 (92.86)</td>
</tr>
</tbody>
</table>

* This case had progressively increasing oligospermia. His last sperm count at 12 weeks after percutaneous fulguration was only 20,000/cc. The patient did not turn up for further follow up.

The cases were followed up for 3 months. After two weeks 10 cases had oligospermia (71.42%) and 4 were azoospermic (28.58%). At the end of 3 months 13 cases (92.86%) were azoospermic, while, 1 case (7.14%) was still oligospermic (sperm count 20,000/cc.).
Table No. 6

Showing the complications following open vasectomy.

Total number of cases = 10.

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Complication</th>
<th>Number of patients</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Haematoma</td>
<td>Nil</td>
<td>-</td>
</tr>
<tr>
<td>2.</td>
<td>Infection</td>
<td>2</td>
<td>20%</td>
</tr>
<tr>
<td>3.</td>
<td>Epididymo-orchitis</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>4.</td>
<td>Failure</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>5.</td>
<td>Sinus formation</td>
<td>1</td>
<td>10%</td>
</tr>
</tbody>
</table>

From the above table, it is obvious that rate of infection in 2 patients constituted 20% and sinus formation in one case constituted 10%. There was no haematoma formation, nor epididymo-orchitis in any case.
Table No. 7

The table showing the sperm count at 2 weeks, 1 month, 1½ month, 2 months and 3 months time after open vasectomy. Total number of patients = 10.

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Sperm count</th>
<th>At 2 weeks number of patients (%)</th>
<th>At 1 month number of patients (%)</th>
<th>At 1½ month number of patients (%)</th>
<th>At 2 months number of patients (%)</th>
<th>At 3 months number of patients (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Normal count</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2.</td>
<td>Oligospermia</td>
<td>8 (50%)</td>
<td>6 (60%)</td>
<td>3 (30%)</td>
<td>1 (10%)</td>
<td>-</td>
</tr>
<tr>
<td>3.</td>
<td>Azoospermia</td>
<td>2 (20%)</td>
<td>4 (40%)</td>
<td>7 (70%)</td>
<td>9 (90%)</td>
<td>10 (100%)</td>
</tr>
</tbody>
</table>

The cases were followed up for 3 months. After 2 weeks' time 8 cases were oligospermic (80%) and 2 cases were Azoospermic (20%) and at the end of 3 months all cases were azoospermic (100%).
### Table No. 8

<table>
<thead>
<tr>
<th>Complications</th>
<th>Percutaneous fulguration of vas (Percentage)</th>
<th>Open vasectomy (Percentage)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Haematoma</td>
<td>1 (4.54%)</td>
<td>Nil</td>
</tr>
<tr>
<td>Infection</td>
<td>Nil</td>
<td>2 (20%)</td>
</tr>
<tr>
<td>Epididymo-orchitis</td>
<td>Nil</td>
<td>Nil</td>
</tr>
<tr>
<td>Ulceration of skin</td>
<td>2 (9.08%)</td>
<td>Nil</td>
</tr>
<tr>
<td>Failure</td>
<td>1 (4.54%)</td>
<td>Nil</td>
</tr>
<tr>
<td>Sinus formation</td>
<td>Nil</td>
<td>1 (10%)</td>
</tr>
</tbody>
</table>

It is obvious from the above table that haematoma formation (4.54%) and ulceration of skin (9.08%) were the complications encountered after percutaneous fulguration of vas while infection (20%) and sinus formation (10%) were the complications seen after open vasectomy. There was no failure of vas occlusion after open vasectomy, while percutaneous fulguration of vas failed to cause complete occlusion of vas resulting in the failure of the technique in one case only (4.54%). However, this was the most common complication observed.
Photograph of a gross specimen of segment of vas resected 10 days after percutaneous fulguration. At the site of fulguration the vas is completely divided into two and on either sides show nodular thickening.
Microphotograph showing irregular thickening of the wall of the vas and irregular proliferation and multilayering of the epithelium lining the lumen of the vas resulting in marked narrowing of the lumen. Vas was removed seven days after percutaneous fulguration

H&E X 28
DISCUSSION
DISCUSSION

This study was undertaken to compare the results of 2 methods of vasectomy in males. One is the old method of open vasectomy, in which vas is exposed through an incision in the scrotum, cut and ligated and wound sutured. Second - a new method of closed vasectomy, in which vas is cut by electro-surgical cautery through a cataract knife inserted into the sides of scrotum. No incision is made and no sutures are applied. It was through appropriate to compare the new technique with the old in respect of success rate incidence of immediate and late complications and patient acceptability. First the new method was tried in patients of Benign Prostatic Hypertrophy waiting to undergo definitive prostatic surgery and when it was seen that the method is very safe and successful and has minimal complications, it was tried in patients coming for voluntary sterilization.

Open method was used in cases who had some accompanying pathology in inguinal scrotal region where it was thought proper not to use close method. The most common cause was Hydrocele, followed by epididymo-orchitis and inguinal hernia.
As will be seen in table No. 4, out of 22 cases done by closed method, haematoma formation was observed in 1 case (4.54%), ulceration of skin in 2 cases (9%), and failure in 1 case (4.54%). There was no case of infection and in one case of failure, at re-operation it was found that vas was not cut.

Seminograms were done in all cases at 2 weeks interval. It was seen that out of 14 cases, 4 patients became azoospermic at 2 weeks, 8 patients became azoospermic at 4 weeks and 13 became azoospermic after 3 months.

In 10 patients, open vasectomy was done. Two patients developed infection (20%) and one patient developed sinus formation (10%), which had to be operated again and thread stitch was taken out, which was acting as foreign body in infected wound. There was no case of failure. All cases became azoospermic after 3 months.

Thus it will be seen that closed method compares favourably with open method, the risk of sinus formation and infection being nil. On the other hand, there is some risk of haematoma and occasional risk of failure due to non-cutting of vas, as the technique is blind and one has to depend on the feel of vas by fingers.