Cervical factors in infertility

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The cervix is very important in the process of reproduction. The spermatozoa must travel through its canal to fertilize the ovum in the fallopian tubes. Millions of sperm must be deposited in a receptive cervical canal to ensure that hundreds will get to the tubes. Cervix also functions as a biological vulve, this is in the sense, that in the proliferative phase, it permits the entry of sperm and in the secretory phase, hinders their penetration. So, dysfunction at this level should be carefully evaluated.

In infertility, cervical factors account for 5%. Whether the real cause is unexplained or "Cervical" infertility, the treatment of choice is super ovulation/IUI, followed by IVF if the previous one fails.

Abnormalities of the cervix or it's endocervical secretion can cause infertility. It is unfortunate that the cervix often neglected in an infertility investigation. So during infertility investigation, proper evaluation of cervical factors should be done by a) Physical Examination of cervix, b) Properly and timed post coital test (PCT).

The following anatomical and physiological factors play important role in normal fertility:
The cervix usually pointed towards the posterior fornice, so that following ejaculation, the external OS is immersed in the seminal pool.

Cyclical alteration occurs in the diameter of the external OS, cervical canal and isthmus, being widest at ovulation time for passage of spermatozoa.

Cyclical changes of the secretion of endocervical glands which under estragenic influence in the pre-ovulatory phase produce favorable mucus for sperm penetration and survival and under progesterone influence in the post ovulation phase produce inhibitory effects.

Properly and timed post coital test is most important for the evaluation of cervical factors. It has been traditionally employed to assess’ sperm survival in cervical mucus, characteristic of cervical mucus and the ovarian function by examining the cervical mucus under high power microscope, because altered cervical mucus and increased immunogenicity is mostly responsible for infertility. The characteristic of cervical mucus should be recorded; including its to dry on the slide. A cervical score can be obtained by quantifying each of these characteristic from 0 to 3; a score of less than 5 indicating cervical hostality, greater than 10 being satisfactory and 15 maximal.

Cervical hostality arises (though apparently normal) either poor cervical mucus or antibodies against the sperm present in the cervical mucus. Immunoglobulin A (IgA) antibody are found in the cervical mucus (identified by PCT) attached to the sperm head to be bind to mucin chain in the mucus and causes the sperm to display a characteristic 'Shaking' movement and is highly detrimental to cervical mucus penetration.

Cyclical changes of the secretion of endocervical glands occur in both Pre and Post ovulatory phases. In Pre-ovulatory phase the secretion is thin, copious which is

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favorable for sperm penetration and survival. But in the post ovulatory, the cervical mucus become thick, scanty due to Progesterone influence which hinders the sperm penetration. Penetration of cervical mucus by sperm has been shown to be rapid, occurring within one and a half to three minutes in the majority of women studied. This is the phenomenon for which only the motion of the sperm is responsible.

**Cervical scoring system**

<table>
<thead>
<tr>
<th>SCORE</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quantity</td>
<td>0 ml</td>
<td>0.1 ml</td>
<td>0.2 ml</td>
<td>&gt;0.3 ml</td>
</tr>
<tr>
<td>Viscosity</td>
<td>Thick</td>
<td>Intermediate</td>
<td>Mildly viscous</td>
<td>Normal</td>
</tr>
<tr>
<td>Cellularity</td>
<td>11 Cells/HIF</td>
<td>6-10 Cells/HIF</td>
<td>1-5 Cells/HIF</td>
<td>&lt;1 Cell/HIF</td>
</tr>
<tr>
<td>Ferrign</td>
<td>No</td>
<td>Appylic</td>
<td>Pattern</td>
<td>Sperm</td>
</tr>
<tr>
<td>Spinnbarkeit</td>
<td>&lt; 1 cm</td>
<td>1-4 cm</td>
<td>5-8 cm</td>
<td>&gt;9 cm</td>
</tr>
</tbody>
</table>

The following cervical conditions, therefore may effect the normal process of reproduction:

### Anatomical alteration of the cervix (congenital & acquired)

**Abnormal position of the cervix pointing upwards so that it is away from the seminal pool in the posterior fornics.**

Hypoplastic cervix which usually denotes a hypoplastic uterus due to inadequate estrogenic stimuli.

Hypertrophic cervix which usually result from old lacerations and chronic cervicitis or growth, may affect satisfactory deposition or retention of semen.

**Stenosis of the OS or cervical canal** as sequelae of electrocautery, cryotherapy, conization, amputation of the cervix may affect sperm migration.

**Synechiae in the canal** as sequelae of postpartum or post abortal curettage or infection may likewise affect sperm migration. Laceration, scaring, distortion, congenital elongation of cervix, displacement, incompetence, acute retroversion may affect fertility.

### Defective Endocervical Mucus

Endocervicitis or dloric cervicitis may interfere with proper mucus production and affect sperm migration and survival.

Scanty mucus can be the result of anti oestrogen e.g clomiphyen citrate or poor glandular activity of cervical endothelium as sequelae of destruction of endocervical gland with extensive electrocautery, cryotherapy, conization, amputation, synaechiae and scarring.

### Growth of Cervix

Polyp or myoma may interfere with normal migration of sperm. They also tend to be infected and by keeping the canal open, may permit the development of a low grade endometritis. A poor cervical mucus is common.

### Investigations

#### Routine Tests

1. History should be included a careful review of past gynaecological history (e.g. operation In the cervix, electrocautery etc.) and also a past obstetrics history (e.g. difficult forceps delivery, infection etc.).

2. Physical examination should take note of the position, size, structural abnormality of the cervix, cervicitis, new growth.

3. Probing of the cervix is also done to determine the length and course of the canal and the presence of stenosis or I synaechiae or new growth.

4. Evaluation of the endocervical mucus at around the time of ovulation by PCT reveals a copious, watery, clear with good spinnbarkeit, hypoce"ular mucus, when dried, a good ferning patterned is formed. The cervical OS at this time opens. The pH of the mucus should be alkaliJe (7-8.2). Spermatozoa are immobilised at pH below 6.5.

5. Culture and sensitivity of endocervical mucus, especially, for chlamydia and mycoplasma should be considered if 'there is good evidence of endocervicitis or if the ovulatory mucus has plenty of leucocytes or repeated PCT show poor result.

6. Special Tests

**Post Coital Test**

This test is done at or around the ovulation time (24-48 hrs) before expected rise of basal body temperature or 15-16 days before expected mense when the oestrogenised
cervical mucus is most receptive to sperm. Initial PCT performed 8-12 hours after intercourse. A sample of cervical mucus is aspirated from cervical OS and placed in a glass slide for examination under high power microscope to see character of cervical mucus, number of motile sperm. PCT provide information about:

a. Coital technique b. Quality of cervical mucus c. Quality of semen d. Ovarian function

**Sperm Cervical Mucus Compatibility Test (SCMC-T)**

This in vitro cross over test is performed using mid cycle cervical mucus of the wife and semen of the husband under question and compare with donor sperm and donor cervical mucus. This is indicated if the consecutive three PCT became negative. In this test where shaking of motile sperm at the mucus interface denotes the presence of antibodies (IgA) either on sperm or in the cervical mucus. The site of origin can be identified by cross-over testing with donor sperm and mucus respectively. Poor sperm-mucus penetration in the absence of sperm shaking movement in SCMC-T provide evidence of non immunological cervical hostility.

**Treatment**

**Congenital factors**

Stricture or stenosis may be treated with dilatation of cervix under anaesthesia. Hypoplasia of the cervix and uterus require endocrine investigation prior to any therapy. Treatment consist of large doses of oestrogen given cyclically for 6-12 months, preferably, with a sequential progestin (e.g. premarin 1.25 mg from 05-025 with progesterone 10mg from 016-025 of cycle).

**Displacement**

The objective is to produce a normal seminal-cervical contact as possible, trials with pessary or artificial homologous insemination (intra cervical) should first be tried before any attempt at surgery.

**Growth**

These should be excised.

**Stenosis**

Stenosis is managed by repeated gentle dilatations, preventing damage to internal OS by over dilatation, as this will result in an incompetent cervix, predisposing habitual abortion.

**Infection**

Carefully obtained culture sensitivity tests should precede treatment whenever possible. Antibiotics- local or systemic, usually doxycyclin for chlamydia are given. Periodic gentle dilatations will help by promoting the drainage of infected mucus. If these are ineffective, cautery with chemicals (Silver nitrate or albothyl concentrate) is performed. Electrocautery or cryotherapy should be last resort In resistant cases but avoid entering the endocervical canal as this may lead to stricture. Punctuate cauterization is preferable to linear type cautery.

**Synechiae**

D & C may be tried but no forcible dilatation should be done.

**Lower alkalinity of Cervical mucus**

One table spoonful of sodium bicarbonate in one quart of warm water as pre-coital douche will help to sperm survive.

**Inadequate Oestrogen Stimulation**

Some times, one may see a cervix that is anatomically normal in all respect except for the scantiness of mucus at ovulation time. If destruction of gland or endocervicitis have been ruled out, this may be due to inadequate oestrogenic stimulation. This case may benefit from low dose estrogen given daily from D5 of cycle to about 2 days after rise of basal body temperature (e.g. Premarin 0.625mg).

**Treatment of Antisperm antibody**

Therapy for anti sperm antibodies in the female is complicated by their multiple potential site and modes of action, and by our incomplete understanding of their clinical significance. Thus if anti sperm antibody present in the serum as well as in cervical mucus, their effects are unlikely to be overcome by IUI with washed spe'rm. Pregnancy rate is about 20-30% of patient
who complete at least 3 cycle and alternatively by GIFT (gamete intrafallopian transfer).

In males with sperm-bound antibodies, immunosuppressive therapy given in the absence of contraindication to corticosteroid using a cyclical regime of prednisolon 40 mg/day taken from 01 to 010 of the female partner cycle (Hendry et al 1986). Treatment continued for at least 9 months to achieve result and should be monitored from time to time with repeating antibody test on semen. When there is contraindication to corticosteroid a non steroidal anti-inflammatory agent such as naproxen 50 mg twice daily may lower the antibody levels. Sperm washing and IUI have proved ineffective, but IVF, GIFT and ICSI provide good result.

References