

205

Mr. 154

101

Sclerotherapy as an Outpatient Procedure  
in the Treatment of  
Primary Vaginal Hydrocele in Adults

Pl  
Shyam

Doc B

Submitted by:  
Dr. Shyam Kumar Shrestha, M.B.B.S.

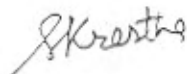
Presented to:  
Institute of Medicine  
Tribhuvan University  
Kathmandu, Nepal

A thesis submitted in partial fulfillment of the requirement for  
the degree of Master of Surgery (M.S.) in General Surgery

September, 1999

## Declaration

I, Dr. Shyam Kumar Shrestha, hereby declare that this thesis, "*Sclerotherapy as an Outpatient Procedure in the treatment of Primary Vaginal Hydrocele in Adults*", has not been submitted in candidature for any other degree. I do not have any objection for the availability of this thesis for photocopy and inter-library loans to outside organizations.



Dr. Shyam Kumar Shrestha, M.B.B.S.

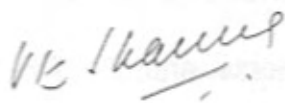
M.S.(General Surgery) Student

September, 1999

## Certificate

This is to certify that the subject of this thesis "*Sclerotherapy as an Outpatient Procedure in the treatment of Primary Vaginal Hydrocele in Adults*" is the result of the original research study undertaken by Dr. Shyam Kumar Shrestha under my supervision and guidance.

Guide



Dr. Vijay Kumar Sharma, M.S., F.I.C.S.

Consultant surgeon & PG teacher

Department of Surgery

Bir Hospital, Nepal.

September, 1999

## Acknowledgements

I am very grateful to Consultant surgeon and PG teacher Dr. Vijay Kumar Sharma, Department of Surgery, Bir Hospital for his indispensable moral support and guidance to carry out this prospective research study as a thesis work for M.S. degree (General Surgery).

I would like to extend my heartfelt thanks to Dr. HN Acharya, Director of Bir Hospital, Dr. LB Thapa, the co-ordinator, PGMECC, Bir Hospital Dr. MK Malla, Head of the Department of Surgery, Bir Hospital and all the patients and their guardians for their permission and support to perform this research work.

I would also like to thank Dr NB Amatya, Head of the Department of Radio-diagnosis, Bir Hospital for scanning the patients and Dr. DB Shrestha, Senior Registrar, Department of Surgery, Bir Hospital for being a valuable constant sources of help and support. Without their help this thesis would not have been materialized.

My special thank goes to my respected teacher Mr. C.K. Gurung, assistant campus chief, Maharajgunj Campus, T.U.T.H., for helping me in statistical analysis of this study.

Finally, I thank my friend Mr. Mohan Shrestha, P.G.M.E.C.C., Bir Hospital for his computer and printing works to give the final shape of this thesis.

With best regards,

**DR. SHYAM KUMAR SHRESTHA, M.B.B.S.**

**M.S. (General Surgery) Student**

September, 1999.

# Contents

<u>S. No.</u>	<u>Table</u>	<u>Page No.</u>
1.	Summary	1
2.	Introduction	2
3.	Literature review	3
4.	Rationale	19
5.	Study design	20
6.	Objectives of the study	21
7.	Patients and Methods	22
8.	Observation and Results	25
9.	Discussion	29
10.	Conclusion	35
11.	Bibliography	36
12.	Appendices	42

## Summary

A total of 40 patients with 41 hydroceles underwent injection sclerotherapy with 5 percent ethanolamine oleate on an ambulatory basis. Scrotal ultrasound was performed before the sclerotherapy to rule out malignant pathology of the testes. Of the evaluated 41 hydroceles, 78 percent (no=32) were cured and 34 percent (no=14) were cured on 1 session of the sclerotherapy only. No hydrocele recurred during the mean follow-up period of 6.5 months. The commonest complication of the sclerotherapy was mild pain (83 percent, no=34) followed by hematoma (7 percent, no=3) and thickening of the tunica (22 percent, no=9). No patient had developed allergic reaction and syncope. Ethanolamine oleate sclerotherapy is a safe, simple, effective and economical form of outpatient therapy which can be recommended as treatment of choice for primary hydrocele in adults and as an alternative to surgery to those clients who refuse surgery or do not want work off.

## Introduction

The surgical operation of primary vaginal hydrocele is the standard treatment in most centers and is widely accepted and practiced as a definite modality<sup>1</sup>. Surgery for primary vaginal hydrocele (e.g. radical tissue dissection, dissection and eversion of sac) is associated with complications such as post-operative scrotal pain, edema, hematoma, infection, trauma to the testes and cord structures, and also requires an operation theater facility plus skilled surgeon<sup>1-5</sup>. Operative treatment leads to loss of work due to hospitalization. Although newer surgical technique e.g. vaginal fenestration<sup>6-9</sup> and endoscopic hydrocele sac ablation<sup>10-12</sup> are associated with less complication rate, they are time-consuming procedures and later technique requires expensive equipment and good surgical expertise. Aspiration sclerotherapy for primary vaginal hydrocele has been known since long<sup>13</sup>. It is a rapid, simple, safe, effective and economical outpatient procedure for primary vaginal hydrocele in adults. It does not need an operation theatre, general or regional anesthesia and hospitalization. It can be repeated if hydrocele recurs. In view of cost-effectiveness and outpatient procedure, aspiration sclerotherapy for primary vaginal hydrocele has gained popularity. A series of study of aspiration sclerotherapy were done after 1975 using a variety of sclerosants such as sodium tetradecyl sulphate<sup>14,15</sup>, ethanolamine oleate<sup>16-18</sup>, tetracycline<sup>19-21</sup>, poliodocanol<sup>22-24</sup> and phenol<sup>25,26,28</sup> with a cure of 33 percent to 100 percent in longterm study.

## Literature review

The word hydrocele was nomenclatured by Ambroise Paré (1510-90)<sup>36</sup>. A hydrocele is an abnormal collection of serous fluid in some part of the processus vaginalis, usually the tunica<sup>36,37</sup>. The fluid has the property of lymph<sup>36</sup>. It has been described since the ancient times<sup>13</sup>.

Hydrocele can be of congenital or acquired origin. Four types of congenital hydroceles are as follows<sup>37</sup>:

1. Vaginal hydrocele
2. Infantile hydrocele
3. Congenital hydrocele
4. Hydrocele of the cord

Acquired hydroceles are either primary (idiopathic) or secondary to testicular diseases (e.g., epididymo-orchitis, trauma, torsion, malignancy and filariasis).

Hydrocele may be familial, Cadwallander (1895) from California published the only account of a "hydrocele family" over three generations<sup>39</sup>. Yates-Bell concluded that "primary hydrocele is often idiopathic and even now little is known about cause except that it is an imbalance between secretion and reabsorption"<sup>40</sup>. Primary vaginal hydrocele is most common in middle and later life but it can also occur in early childhood. Total incidence of hydrocele is 0.87 percent in a male adolescents in China<sup>38</sup>. Hydrocele is painless, benign condition so sometimes it may reach a huge



size before the man comes for treatment. The qualifying term "primary", "idiopathic", "essential" and "non-tropical" are used interchangeably<sup>36</sup>.

### Aetiology

A hydrocele can be produced in four ways as follows<sup>28,29,37,41</sup>:

1. By excessive production of the fluid within the sac e.g., secondary hydrocele.
2. By defective absorption of fluid e.g., primary hydrocele
3. By interference with lymphatic drainage of scrotal structures.
4. By connection with a hernia of the peritoneal cavity in the congenital variety.

### Diagnosis

Diagnosis of the hydrocele is usually made by clinical history and physical examination only. Hydroceles are almost invariably translucent, fluctuation in two planes and it is possible to get above the swelling on local examination of the scrotum. These physical signs are usually conclusive. In children it is important to make sure that there is no associated hernia. In adult, testicular tumor is the cause of acute secondary hydrocele (incidence 10 percent)<sup>42</sup> and the amount of hydrocele fluid is less. It can easily be excluded by ultrasound scan. About five percent of inguinal hernia are associated with a vaginal hydroceles on the same side<sup>37</sup>.

*Encysted hydrocele of the cord*<sup>37</sup> presents as a smooth swelling near the spermatic cord which moves downwards and becomes less mobile if the cord is made taut by pulling the testis downwards. The testis is separate from the swelling. In

*congenital hydrocele* <sup>37</sup> the processus vaginalis is patent and continues with the peritoneal cavity so the hydrocele may disappear on lying down position. Hydrocele does occur in females and presents as the cyst in relation to the round ligament and is always at least partially within the inguinal canal. This is also known as *hydrocele of the canal of Nuck* <sup>37</sup>.

### Complications

Following are the complications of the hydrocele:

1. Spontaneous or traumatic rupture
2. Herniation of the hydrocele sac
3. Spontaneous or traumatic transformation into a hematocele
4. Pyocele
5. Calcification of the sac

### Treatment

In young teenagers, hydrocele may subside by itself so no treatment may be required. In grown up people they seldom or never subside spontaneously so they should be treated if hydrocele causes discomfort or complication <sup>43</sup>. Following are the treatment options available for hydrocele:

1. Simple aspiration <sup>13</sup>
2. Injection of sclerotherapy <sup>14-27,30-35</sup>
3. Operations
  - \* Radical dissection and excision of the sac <sup>1</sup>
  - \* Dissection and eversion of the sac e.g., Bottle <sup>44</sup>, Jaboulay <sup>45</sup>, Winkelmann <sup>1</sup>.

- No dissection or no excision of the sac e.g., Lord,<sup>1,4</sup> Solomon<sup>46</sup>, Wilkinson<sup>47</sup>.
- Window operation or vaginal fenestration of the sac<sup>7-9</sup>
- Endoscopic ablation of the sac<sup>10,11</sup>

### Simple aspiration

Hydrocele fluid can be drained aseptically with a canula but this simplest treatment is not curative<sup>13</sup>. The fluid invariably reaccumulates within a week or so. So, this method of treatment is ineffective. Further, repeated aspirations may complicate the hydrocele i.e., hematocele or pyocele and if not done properly, there is high risk of testicular injury. So, this is not recommended treatment.

### Injection sclerotherapy

In the medieval period William of Saliceto (13th century) punctured the sac with a lancet and drained the fluid with a canula. Through the canula, he introduced sugar and ginger. Therefore, he can be regarded as the pioneer of the injection sclerotherapy of the hydroceles<sup>13</sup>. To obliterate the hydrocele sac, many fluids have been injected e.g., brandy, port wine, sugar, ginger, quinine and urothane<sup>48</sup>. Nowadays, commonly used sclerosant agents are phenol<sup>25,26,28,32</sup>, sodium tetradeceyl sulfate<sup>14,15</sup>, tetracycline<sup>19-21</sup>, polidocanol<sup>22-24</sup> and ethnolamine oleate<sup>16-18</sup>. The sclerosants cause a cellular foreign body reaction producing adhesions of the tunica walls and fibrosis of the secreting cells within the sac<sup>15,21,30,31</sup>. The sclerosants can be given with local anesthetic agents (i.e., xylocaine or bupivacaine) or under spermatic cord block so the procedure is relatively painless. It does not need regional or general anesthesia and hospitalization. It is safe, effective and economical.

Hydrocele was being treated by different methods e.g., incision (most ancient method used by stone-age people), excision (Celsus), seton (Galen, 2nd century), cautery (Avicenna, 10th century), tent (Hugh of Lucca, 13th century), acupuncture (Zacutus Lusitanus of Amsterdam, 16th century) and caustic (Francois Thevenin, mid-16th century) <sup>13</sup>. Lember, a French surgeon, reintroduced injection sclerotherapy of hydrocele in 1667. He used sublimate of Mercury dissolved in limewater and reported several successful cases. The method was forgotten again and reintroduced by Munro of Scotland in the mid-seventeen hundreds. He used brandy as a sclerosant agent. Samuel Sharp, at about same time, injected brandy in one case which was complicated by severe inflammation. So, he abandoned this procedure. Douglas, Le Dran and Pott disapproved this procedure which again fell into disrepute in the late seventeen hundreds. By the end of the nineteenth century, Sir James Earle, a surgeon at London of St. Bartholomews Hospital reintroduced the injection therapy with milder solution i.e., half strength portwine. Mr. Martin, a surgeon from Calcutta, India treated 2393 cases of hydroceles in 7 years (1832-39) with tincture of iodine and he reported excellent result with failure less than 1% <sup>13</sup>.

Sir Astley Cooper advocated zinc sulfate for injection sclerotherapy. He refers to the most famous sufferer from hydrocele of that period: "the largest hydrocele I have ever heard of was the historian Mr. Edward Gibbon (1737-1794), [the author of *The Decline and Fall of the Roman Empire*] from whom Mr. Cline drew off 6 quarts of fluid". He was very attentive to ladies but he never married probably due to large hydrocele. He died of sepsis after being tapped by Mr. Cline <sup>13,37</sup>.

Another famous sufferer from the hydrocele in the history was George Bernard Shaw who tolerated it for many years. He described it as an "unseemly nuisance". One night, turning awkwardly on bed he felt something burst. He thought it was hot water bottle but it was his hydrocele. Fortunately, his hydrocele was cured spontaneously. Later, he married his nurse.

Sclerotherapy injection with 3 percent phenol has been safely and successfully used in treatment of oesophageal varices. Moloney <sup>32</sup> (1975, U.K.) conducted a prospective study of 2.5 percent phenol sclerotherapy of the hydroceles (no = 14) and epididymal cysts and compared it's efficacy and complications with all types of surgery of the hydroceles. He observed high complication rate i.e. hematoma (17 percent) and sepsis (10 percent) in surgically treated group with an average hospital stay of five days and a much longer time off work, whereas in other group of sclerotherapy, complication rate was negligible with no failure rate on completion of the treatment (1-3 out-patient visits). Moloney revived the general interest on the injection sclerotherapy. After him, many interested researchers had performed a series of trials of injection sclerotherapy of hydroceles in 8th and 9th decades of this century.

Nash <sup>33,44</sup> (1979, U.K.) carried out a prospective study on the efficacy of 2.5 percent phenol as sclerotherapy for treatment of hydroceles (no =36) and epididymal cysts (no=13). 98 percent cases were cured in an average follow-up of 18 months (1-5 out-patient visits) and free from all but minor side effects e.g., scrotal / lower abdominal dull ache, thickening of the tunica and cord.

No patient had developed infection and hematocele.

A decade later, Savion et al <sup>25</sup> (1989) treated a total of 63 hydroceles in adults with 2.5 percent phenol solution and found primary cure rate with one injection of 51.6 percent and cumulative success rate of 98 percent with multiple injections with virtually no complication except for local pain and allergic reaction in 2 patients. Their study concluded that phenol sclerotherapy is a painless, highly cost-effective procedure in adults that permits one to avoid an operation, anesthesia and hospitalization.

In 1996, Ozdemir <sup>26</sup> conducted a prospective study of injection 3 percent phenol sclerotherapy for hydroceles (no = 31) in adults on ambulatory basis. The over-all cure rate was 96 percent on mean session of 2.2 (range = 1-7) during an average follow-up of 3 years and primary cure rate was 58 percent with one injection only. Neither anesthesia nor antibiotic was used. This study concluded that injection phenol sclerotherapy for hydroceles is an effective, economical and safe form of treatment for hydroceles.

Apart from tetracycline, many other sclerosing agents e.g., tetracycline, sodium tetradecyl sulfate, polidocanol, phenol and ethanolamine have been commonly used as sclerosant for vaginal hydroceles.

For a longtime, tetracycline was used as a sclerosing agent in controlling malignant pleural effusion <sup>56</sup>. Lately, it has been used to sclerose the primary hydroceles. It

has an added advantage of being an antibiotic also. In 1987, Bullock and Thurston<sup>19</sup> reported a series of 37 hydroceles and 18 epididymal cysts in older patients who were treated by repeated injections of tetracycline during 9 months period. One patient developed infected hematocele so orchidectomy was performed on him. The author concluded injection sclerotherapy is a safe and cost effective alternative therapy for surgery of hydroceles and epididymal cysts in older patients.

Levine and DeWolf<sup>20</sup> (1988, U.S.A.) reported a series of 28 hydroceles being treated with 10 percent tetracycline as a sclerosant. 75 percent of hydroceles were cured with one injection and over-all success rate was 93 percent in 15 months follow-up period with minimum complications (hematoma in 2 cases and epididymitis in 1 case only). They have concluded aspiration sclerotherapy of the hydroceles a reasonable, effective outpatient procedure as an alternative to the operation.

Rencken et al<sup>57</sup> (1990) also conducted a prospective single blind trial of aspiration sclerotherapy for 27 hydroceles with tetracycline sulfate and 28 hydroceles with rolitetracyclin. The over-all cure rate, complication rate and efficacy were almost equal.

Shokeir et al treated<sup>21</sup> patients with symptomatic hydroceles in renal transplant recipients with injection tetracycline and 1 percent lidocaine. They dissolved one gram of tetracycline in ten ml of 1 percent lidocaine and used 5 ml for 100 ml volume hydroceles and added 2.5 ml for each increment of 100 ml of hydrocele fluid volume.

The hydroceles had resolved completely in 57 percent (no =12) and partially in 33 percent (no = 7) with 10 percent complication rate (no =2).

Musa et al <sup>21</sup> (1995, Sudan) conducted a prospective study in 94 acquired hydroceles (no = 82), of which 62 hydroceles were treated by repeated sclerotherapy with tetracycline hydrochloride and 28 cases were treated surgically (excision and eversion of sac) as controls. All patients were followed up for one year and sclerotherapy was repeated at an interval of 1, 3 and 6 months if hydroceles had recurred. The over-all cure rate in sclerotherapy group was 95 percent with few complications i.e., pain (10 percent), local infection (12 percent) and hematoma (5 percent). There was no recurrence in surgical group but infection (25 percent) and hematoma (7 percent) rate were high. The mean hospital stay in surgical group was  $3.4 \pm 1.3$  days (range 1-7 days). 4 patients had thick-walled hydroceles and had persistent recurrence after sclerotherapy. Recurrence (no=10) was very frequent in aged patients (60-69 years) and large hydroceles (200-600 ml). They had concluded aspiration sclerotherapy of tetracycline for thin-walled hydroceles was curative, simple, safe, cost-effective outpatient procedure. They recommended this therapy as an alternative to surgery in developing countries:

Sodium tetradecyl sulfate is an anionic detergent with surface adhesive properties that acts by lysis of the endothelial cells lining the sac and is also used for sclerosing varicose veins <sup>55</sup>. Many authors have used it as injection sclerotherapy for treatment of hydroceles.



MacFarlane<sup>14</sup> (1983) treated 30 patients of hydroceles and epididymal cysts with 3 percent sodium tetradecyl sulfate as sclerosant. 10 hydroceles were cured by one injection whereas remaining 10 cases were cured by 3 repeated injections. There was no recurrence in all patients who completed the courses and complication rate was also minimal.

Braslis and Moss<sup>59</sup> (1996) had reported their experience of a 9 year prospective study of sodium tetradecyl sulfate sclerotherapy for the treatment of 102 symptomatic hydroceles. The success rate was 94 percent with multiple treatments during the mean follow-up of 30 months (range 2-100). In conclusion, they reported sclerotherapy was a cost effective outpatient method for the treatment of symptomatic hydroceles.

Stattin et al<sup>15</sup> (1996, Sweden) also had done a study of sodium tetradecyl sulfate including 106 hydroceles and followed up them for 40 months. 95 percent of them were satisfied with the long-term outcome of the sclerotherapy and over-all success rate was 88 percent with minor side effect i.e., pain. Two diabetic patients developed local sepsis following sclerotherapy and they eventually needed orchidectomy for control of sepsis.

Polidocanol is a sclerosant widely used for sclerotherapy of varicose veins<sup>23</sup>. It has local anesthetic property. Many authors have used it as sclerosant agent for the treatment of acquired hydroceles.

Lund and Bartolin<sup>22</sup> (1992) treated 20 hydroceles patients with injection polidocanol following aspiration of hydrocele fluid. Only three patients had recurrence with virtually no complication. Polidocanol injection is painless. They concluded polidocanol as a promising sclerosant for treatment of hydroceles and recommended for further investigation for primary therapy of hydrocele.

A year later in 1993, Andersen and Bentsen<sup>60</sup> reported a series of 30 hydroceles of 28 patients treated with 3 percent polidocanol after evacuation of the hydrocele fluid and followed up them for 62 months. 24 cases had no sign of relapses. Only 3 cases had noticed small relapse and they were treated surgically. Finally, they concluded this polidocanol sclerotherapy as a relatively painless, simple and economical alternative therapy to surgery.

Fuse et al<sup>61</sup> (1994) also completed a study including 15 patients with hydroceles of the testis and cord. They used injection polidocanol after evacuation of the fluid. The cure rate was 73 percent in one session but the over-all cure rate was 87 percent after multiple sessions of sclerotherapy.

They concluded that polidocanol sclerotherapy was a very easy, highly effective, painless without local anesthesia and a useful alternative to open operation of hydrocele.

Sigurdsson et al <sup>23</sup> (1994, Sweden) also reported a series of 87 patients having 63 hydroceles and 29 epididymal cysts with injection sclerotherapy with injection polidocanol on an outpatient basis. 67 percent of hydroceles were cured in one session and over-all cure rate was 87 percent after a median follow-up period of 12 months. 94 percent patients were satisfied with the procedure which was virtually without any complication. Finally, they recommended injection sclerotherapy with polidocanol as a primary treatment for hydroceles in older patients (>40 years).

Mizoguchi et al <sup>24</sup> conducted a study of clinical efficacy of sclerotherapy of hydroceles with single injection 3 percent polidocanol in 12 hydroceles of 11 patients. 75 percent of hydroceles disappeared completely after 6 months, as evidenced by the ultrasonography. The procedure was virtually painless and without any complication. Two patients had recurrence of hydrocele and hydrocelectomy was done on them. They concluded this procedure to be a safe and useful technique for the treatment of primary hydroceles of testis.

Ethanolamine oleate has been in use for more than 40 years for the treatment of bleeding oesophageal varices <sup>62</sup>. Various studies have been done to test the efficacy and safety of ethanolamine oleate as a sclerosant for hydroceles, spermatoceles and epididymal cysts. Tammela et al <sup>18</sup> (1992, Finland) reported a series of 102

hydroceles in 100 patients with injection ethanolamine sclerotherapy and found primary cure rate was 68 percent and cumulative cure rate was 98 percent in mean follow-up period of 46 months. Approximately, half of the patients noticed pain after sclerotherapy, three patients had infection and two patients had hematoma. Scrotal ultrasound examination of the testis was performed before the sclerotherapy and at each follow-up visit (first visit fixed at 3 months then 12 months if there was no recurrence in the first visit). No change in the structure or size of the testicles were observed by ultrasound examination during follow-up. Testicular biopsy was done on 3 patients operated after sclerotherapy. The testicular structure and spermatogenesis were histologically normal and no fibrosis was observed. They concluded ethanolamine oleate sclerotherapy is a safe, cost effective outpatient therapy that can be recommended as treatment of choice for primary hydrocele in adults.

Apart from above mentioned sclerosant agents, other like bismuth phosphate, OK-432, fibrin glue have been used to treat vaginal hydrocele in adult with variable success rate.

Dimberg et al <sup>63</sup> (1988) reported a series of 38 testicular hydroceles with injection bismuth phosphate and found a cure rate of 53 percent in 24 months follow-up period. 25 percent patients showed clinical improvement. In conclusion, this method may be recommended as an alternative to surgery in elderly patient with testicular hydrocele.

Yamamoto et al <sup>64</sup> (1994) reported a series of 20 patients with testicular hydroceles using a new sclerosant, i.e., OK-432 derived from group A streptococcus pyogenes of human origin and followed up for 13 months (median period = 6 months). 18 patients required only one treatment and two patients had recurrence and received repeated injections. Complications were virtually nil except for local inflammation. They recommended OK-432 as an efficient, simple and primary treatment for hydrocele.

Cecchi et al <sup>65</sup> (1997) performed sclerotherapy of hydroceles (n= 8) with a fibrin sealant (Tissucol) under surface anesthesia using lidocaine and prilocaine. Only 2 recurrences were observed during follow-up. The procedure was painless except for needle prick. They concluded the fibrin adhesive sclerotherapy is an alternative to surgical treatment of hydroceles.

### Hydrocele operations

With the advent of the antiseptic (Carbolic acid) by Volkmann in 1881, "Volkmann: antiseptic incision" was performed. Theodore Kocher (1895) revived the tunica vaginalis excision through the inguinal approach. Eversion of sac (first described by Jaboulay of France, but called winkelman's method in Germany) consists of suturing the bivalved tunica behind the epididymis <sup>13,45</sup>. In 1901, Orville Herwitz, one of the American Urological Association's founding father advocated that eversion with suture is most satisfactory form of surgical treatment for hydrocele.

In 1907, Wyllys Andrews <sup>13,44</sup> introduced "the bottle operation" which consists of a small incision high in the sac through which the testicle is extruded with inversion of

sac over the epididymis, thus requiring no sutures. So, this operation is simple and rapidly performed.

Peter H. Lord<sup>2</sup> (1964, U.K.) reported a series of 22 hydroceles treated by a simple, bloodless operation with no dissection and no eversion of the sac. In this operation, a small incision was made through the skin, dartos and tunica vaginalis. The testis was extruded out and the tunica vaginalis was plicated using six to ten 4-0 catgut to form a collar around the junction of the testis and the epididymis (this is known as gathering). The incidence of post-operative hematoma, infection and recurrence was virtually nil<sup>1,3,4,49,50</sup>.

Currently, the surgical repair of hydrocele is the standard treatment in most centers and is widely accepted as a definitive modality<sup>1,2,4,21,37,42,49,50</sup>. Various techniques of hydrocele operation as (mentioned above) have been associated with complications including hematoma (0-22 percent), infection (2-14 percent) and recurrence (5-10 percent)<sup>1,4,32</sup>. Lord procedure<sup>1,2,4,49,50</sup> is regarded as best operation for hydrocele because it has virtually no post-operative complications and failure. It can be performed as daycare surgery.

#### Vaginal fenestration / window operation

Falandry<sup>7,8,9</sup> (1995) reported a series of 83 hydroceles treated by cutting a window in the tunica vaginalis in two stages. In the first stage, the two layers of the tunica vaginalis are folded separately to form the edges of the window. In the second stage,

the parietal layer of the window as attached to the dartos which remains united with the underlying subcutaneous layer, forming an excellent tract for lymph drainage. The cure rate of his series was 90 percent in 5 years follow-up period.

### Endoscopic hydrocele ablation

Ho G.T. et al <sup>10,11</sup> (1993,U.S.A.) new endoscopic procedure for the treatment of symptomatic vaginal hydroceles (n0 = 10). The parietal layer of the tunic vaginalis was ablated endoscopically using either electrocautery using roller ball electrode or laser through a small skin incision. This procedure was done under bilateral cord block with local anesthesia. There were no recurrence, hematoma and infection in 6.1 months follow-up period. They concluded this endoscopic ablation was an effective, well-tolerated alternative to treatment of hydroceles with minimal post-operative morbidity.

## Rationale

The etiology of acquired vaginal hydroceles seems to be an imbalance between secretion and absorption of lymphatic fluid into the tunica vaginalis, this imbalance can result from overproduction or defective absorption of fluid <sup>28,29</sup>. The vaginal hydroceles can be cured by either surgery or sclerotherapy using various sclerosants e.g., tetracycline, ethanolamine oleate, sodium tetradecyl sulfate, phenol and polidocanol. All sclerosants have common property of being destructive to the tunica vaginalis and subsequently cause a cellular foreign body reaction producing adhesion of the tunica walls and fibrosis of the secreting cells within the sac. Hence, the hydroceles can be cured <sup>15,21,30,31</sup>. As hydrocele of testis is a benign condition, it seems desirable to restrict treatment to a minimally invasive procedure and judge the treatment efficacy by patient's opinion and the complications of the therapy. The results of surgery with radical dissection or dissection with eversion of sac were inferior to those obtained with sclerotherapy in a non-randomized study <sup>32</sup>. The reported cure rate and incidence of the complications of the best surgical treatment for acquired hydroceles i.e., Lord procedure <sup>1,2,4</sup> is equal to those of sclerotherapy in non-randomized studies <sup>14,18,20,31-35</sup>. The sclerosing effect of the ethanolamine is permanent <sup>18</sup>. Hence, we conducted a prospective research study on 5 percent ethanolamine oleate sclerotherapy in the treatment of the acquired vaginal hydroceles in adult population on the ambulatory basis at Bir Hospital, Kathmandu.



## Study design

Prospective study of the aspiration sclerotherapy using a sclerosant agent – five percent ethanolamine oleate as out-patient procedure in the treatment of the primary vaginal hydroceles in adult population.

## Objectives

1. To study the efficacy of aspiration sclerotherapy in the treatment of primary vaginal hydrocele in adults.
2. To study the complication rate of aspiration sclerotherapy in the treatment of primary vaginal hydrocele in adults

## Patients and methods

### Study setup

Surgical out-patient clinic

Bir Hospital, Kathmandu.

### Study period

One year (September, 1998 to September, 1999).

### Study population

41 hydrocele cases in adults.

### Inclusion criteria

Primary vaginal hydrocele in adults was included in the study.

### Exclusion criteria

The following patients of primary vaginal hydrocele were excluded from this study.

1. Complicated hydroceles (e.g., pyocele, hematocele, thickened tunica with negative transillumination test).
2. Doubtful diagnosis of hydrocele.
3. Hydrocele associated with hernia .
4. Hydrocele with local scrotal skin diseases e.g. scabies, tinea, sebaceous cysts and unhealthy scrotal skin.
5. Patients who can not be followed-up ( follow-up absentee ).
6. Dry tap or bloody tap.

## Diagnosis of hydrocele

Clinical diagnosis of primary vaginal hydrocele was made on the basis of history and physical examination (scrotal swelling which is cystic, fluctuant, irreducible and transilluminant).

## Treatment method

The informed written consent of the patient was taken prior to the treatment. Routine tests of blood and urine were done to exclude diabetes mellitus. Ultrasound examination of both scrotum was done to rule out malignant pathology of testis. After taking full aseptic & antiseptic measures and avoiding blood vessels, a wide-bore intravenous canula (no. 18) was inserted into the most prominent site of the hydrocele under local anesthesia anteriorly and cord block (5-10 ml of injection 1 percent xylocaine) and the hydrocele fluid was drained completely by a 25 or 50 ml disposable syringe and the volume was be recorded. Keeping the canula in-situ injection 5 percent ethanolamine oleate (5 ml for each 150 ml volume of hydrocele was injected into the tunica vaginalis. The scrotum was massaged gently to disperse the sclerosant agent. A scrotal support was given or alternatively, the patient used a clean and tight underwear. Oral analgesic (Tab. paracetamol, 1 gm PO 6 hourly or on demand) was prescribed. No antibiotic was prescribed.

### **Follow-up of the patient**

After aspiration sclerotherapy, each patient was re-examined at an interval of 1, 3 and 6 months. If the hydrocele recurred at any of the follow-up visits, the repeat dose of sclerotherapy was given. Any complication was noted and treated. Recurrence of hydrocele after last session of the sclerotherapy (i.e. after 6-9 months) was considered as a failure and no further sclerotherapy was given. Any patient who failed to attend a minimum of two follow-up schedules was regarded as an absentee and was excluded from the study.

### **Limitation of the study**

The recurrence and long-term effect of the sclerotherapy on testes was not studied.

### **End of the study**

After the last repeat dose of the sclerotherapy, each patient was re-examined at an interval of 3 months and was discontinued from the study. The data collected was analyzed with suitable statistical tools (chi-square test) and results obtained at the end of the study.

## Observation and results

In this prospective study of non-surgical treatment of primary vaginal hydrocele in adults, 45 hydroceles (43 patients, 2 patients had bilateral hydroceles) underwent aspiration sclerotherapy with injection 5 percent ethanolamine oleate within the study period of one year duration (from 1998.9.17 to 1999.9.9). All the procedures were carried out under spermatic cord block with 1 percent injection xylocaine (5-10 ml) in the minor operation room of the surgical outpatient clinic of Bir Hospital, Kathmandu, Nepal. Four cases of hydroceles were excluded from the study because 3 patients (1 patient had bilateral hydroceles) failed to attend the minimum follow-up schedules which was fixed at the interval of 1, 3, 6 months from the primary session of the sclerotherapy. So, only 41 hydrocele cases were analyzed in this study.

The mean age of the patients was 33.90 years (range 16-60 years). The mean duration of the hydroceles was 38.36 months (range 2-144 months). The mean volume of the primary aspirates of the hydroceles was 223.78 ml (range 8-940 ml). The mean session of the sclerotherapy for 41 hydroceles was 1.92 (range 1-4). Most patients were followed up for 6 months period. Only 7 hydroceles cases were followed up for additional 3 months which needed 4 sessions of the sclerotherapy. So, the mean follow-up period was 6.50 months. Of the 41 evaluated hydroceles 34.14 percent (no=14) were cured in 1 session of the sclerotherapy, 36.58 percent (no=15) hydroceles by 2 sessions of sclerotherapy, 4.88 percent (no=2) hydroceles by 3 sessions of sclerotherapy and 2.44 percent (no=1) hydroceles by 4 sessions of the sclerotherapy. So, the overall cure rate was 78.05 percent (no=32) at the end of

one year study period. The sclerotherapy treatment was a failure in 14.63 percent hydroceles (no=6), all of the failed cases have the primary aspirate volume more than 301 ml. Of the six failed cases, 4 patients underwent 4 sessions and 2 patients underwent 3 sessions of sclerotherapy.

Of the evaluated 41 cases, 22 cases were small sized hydrocele containing 150 ml or less of the fluid (cumulative cure rate = 100 percent), 8 cases had medium-sized hydrocele with 151-300 ml of fluid (cumulative cure rate = 87.5 percent), 5 cases had large-sized hydrocele with 301-450 ml of fluid (cumulative cure rate = 40 percent) and remaining 6 cases had a very large hydroceles with more than 451 ml of fluid. To test the correlation between different volumes groups with respect to over-all cure rate, the chi-square test was applied using the software EPI INFO 6, developed by the Center for Diseases Control and Prevention (CDC), Atlanta, USA and World Health Organization (WHO), Geneva. A P value of 0.005 or less was considered statistically significant (table I).

Table I: Cure rate of ethanolamine oleate sclerotherapy of hydroceles (no=41), based on the volume of the aspirate of hdrocele fluid.

Volume group (ml)	No. of hydroceles	Primary cure rate	Cumulative cure rate	No. of session
≤ 150	22	50 % no=11	100 % no=22	1.54 range 1-3
151-300	8	37.5 % no=3	87.5 % no=7	1.62 range 1-3
301-450	5	nil	40 % no=2	2.40 range 2-3
≥ 451	6	nil	16.66 % no=1	3.5 range 1-4
Total hydroceles evaluated	no=41	34.15 % no=14	78.05 % no=32	1.92 range 1-4

P = 0.0002

Similarly, to test correlation between age groups as shown in table II, chi-square test was applied to find P value which was not found statistically significant.

**Table II: Cure rate of ethanlamine oleate sclerotherapy of hydroceles (no=41), based on the ages of the patients**

Age group (Years)	No. of hydroceles	Primary cure rate	Cumulative cure rate	No. of session
≤30	21	38.09 % no=8	95.23 % no=20	1.62 range 1-3
31-45	13	38.46 % no=5	61.54 % no=8	2 range 1-4
46-60	7	nil	57.14 % no=4	2.86 range 1-4
Total hydroceles evaluated	41	34.15 % no=14	78.05 % no=32	1.92 range 1-4

P = 0.0238

Despite the sclerotherapy procedures were painless in 31.71 percent (no=13) hydroceles, only 4.88 percent (no=2) cases remained painfree subsequently on follow-up visits (Table III and IV). Of the remaining 39 patients, 9.73 percent hydroceles (no=4) had severe testicular, hypogastric and loin pain immediately following the procedures. The severe pain was treated by bed rest and injection diclofenac, 75mg I.M. and they were all discharged from the outpatient clinic on the same day. Only one patient (2.44 percent) had moderate pain which was treated by ibuprofen, 20 tablets (self-medication). 82.92 percent (no=34) experienced only mild testicular or hypogastric or loin pain which were treated by tablets paracetamol, 1 gm P.O. 6 hourly or on demand at home. Although, one patient had mild testicular pain, he could tolerate the pain without the use of analgesics.



Table III: Incidence of pain and hematocele following sclerotherapy of hydroceles (no=41), based on the volume of the aspirate of hydrocele fluid

Volume group (ml)	No. of hydroceles	No. of Hematocele	Incidence of Pain	No. of session
≤ 150	22	nil	90.91 % no=20	1.54 range 1-3
151-300	8	12.5 % no=1	100 % no=8	1.62 range 1-3
301-450	5	20 % no=1	100 % no=5	2.40 range 2-3
≥ 451	6	16.66 % no=1	100 % no=6	3.5 range 1-4
Total hydroceles evaluated	no=41	7.32 % no=3	95.12 % no=39	1.92 range 1-4

Three patients had developed hematoceles after sclerotherapy. Their original volume of hydroceles of all patients were more than 210 ml. They were offered surgery. Only one case underwent surgery. Seven hydroceles were complicated by some thickening of tunica vaginalis. Four of them had undergone 4 sessions, one had 3 sessions and one had 2 sessions of sclerotherapy. None of the 41 cases had vasovagal attack, allergic reaction, infection and penile swelling.

Table IV: Incidence of pain and hematocele following sclerotherapy of hydroceles (no=41), based on the ages of the patients

Age group (Years)	No. of hydroceles	No. of Hematocele	Incidence of Pain	No. of session
≤ 30	21	4.76 % no=1	90.48 % no=19	1.62 range 1-3
31-45	13	15.38 % no=2	100 % no=13	2 range 1-4
46-60	7	nil	100 % no=7	2.86 range 1-4
Total hydroceles evaluated	41	7.32 % no=3	95.12 % no=39	1.92 range 1-4

## Discussion

The aetiology of acquired vaginal hydroceles seems to be an imbalance between production and absorption of lymphatic fluid in the tunica vaginalis, this imbalance can result from overproduction or defective absorption of fluid <sup>28, 29</sup>. There is no suitable animal model for the study of the hydrocele because man being the only species with separation of the sac and peritoneal cavity <sup>21</sup>. Simple aspiration of hydroceles without sclerotherapy has been performed for centuries <sup>13</sup>. Recurrences of hydroceles following simple aspiration were frequent so this form of treatment is not recommended. Vaginal hydroceles can be cured by surgery or injection of a scleroing agents. At present there are various sclerosing agents i.e., 3 percent sodium tetradecyl sulphate <sup>14,15</sup>, 5 percent ethanolamine oleate <sup>16-18</sup>, tetracycline <sup>19-21</sup>, 3 percent poliodocanol <sup>22-24</sup> and 3 percent phenol <sup>25,26,28</sup> with a cure <sup>rate</sup> of 33 percent to 100 percent and all have the common mode of action, being destructive to the tunica vaginalis. They cause a cellular foreign body reaction producing adhesion of the tunica walls and fibrosis of the secreting cells within the sac <sup>15, 21,30,31</sup>. Surgical repair has been the standard treatment and is widely accepted as the most definitive modality for hydroceles, especially for communicating and loculated type <sup>1, 2, 32, 37, 42</sup>. However, various techniques of hydrocele operation i.e., radical dissection and excision of the sac, dissection and eversion of the sac, no dissection and no eversion of the sac have been associated with complications, including hematoma (0-22 percent), infection (2-14 percent) and recurrence (5-10 percent) <sup>1,32,51</sup>. In addition, the surgical procedure usually requires a short hospitalization, regional or general

anesthesia and work off for two to six weeks even when convalescence is smooth<sup>14</sup>. Surgical techniques involving no dissection and no eversion of sac of hydrocele have virtually no post-operative complications and failure<sup>1, 2, 4, 49, 50</sup>. Despite various injection sclerotherapy have been practised since the thirteen centuries<sup>13</sup>, the interest on the sclerotherapy has waxed and waned over the years.

A general interest in aspiration sclerotherapy of hydrocele began in 1975 after a report of 14 patients who underwent such therapy (2.5 percent phenol) with minimal complication and no failure<sup>32</sup>. When the results of surgery with excision of the sac were inferior to this non-randomized study. However, sclerotherapy should be compared with the best surgical treatment i.e., Lord procedure in a randomized studies<sup>14, 15, 31, 32</sup>.

The sclerotherapy using various sclerosants (3 percent sodium tetradecyl sulphate<sup>14, 15</sup>, 5 percent ethanolamine oleate<sup>16-18</sup>, tetracycline<sup>19-21</sup>, 3 percent poliodocanol<sup>22-24</sup> and 3 percent phenol<sup>25, 26, 28</sup>) has been reported to be an effective non-surgical treatment for vaginal hydroceles with the cure rate of 33 percent to 100 percent in most series and there seems to be no significant differences in cure rate among various sclerosants. The cure rate of our study is 78.05 percent (no=32), 34.15 percent (no=14) requiring only 1 session of sclerotherapy. Of the 6 failed cases, there was 90 percent reduction of the original hydrocele size in 2 cases and patients were satisfied with the result. If this criterion as in some study<sup>20</sup> is taken as success of sclerotherapy, the overall cure rate will be 83 percent. All failed six cases had hydrocele fluid volume more than 360 ml at primary aspiration. Musa et al<sup>21</sup> (1995,

Sudan) had also reported that recurrence was very common in large hydroceles (200-600) and aged patients (60-69 Years).

The over all cure rate of our series has been compared with the earlier series using different sclerosants (table V). The P values of all series were calculated by chi-square test using software EPI INFO 6 and they were not significant statistically (all p values > 0.005).

Table V: Review of literature on long-term outcome of sclerotherapy for hydroceles using different sclerosants

References	Sclerosant agents	No. of hydroceles	Cumulative cure rate (%)	Follow-up period (months)
Nash. 1978	Phenol	36	92	60
Levine & DeWolf. 1988	Tetracycline hydrochloride	28	93	15
Sigurdsson et al, 1994	Polidocanol	63	87	14
Stattin et al. 1995	Sodium tetradecyl sulfate	113	88	40
Present study 1999	Ethanolamine oleate	41	78	6.5

Mac Farlane <sup>14</sup> (1983) reported trial with a 3 percent sodium tetradecyl. 10 of 20 hydroceles were cured with a single treatment and the remainder were cured after several treatments with minimal complications. 2.5 percent phenol solution also has been advocated with 92 percent cure and a 5- year follow-up but repeated sclerotherapy were required to obtained a complete success. Nash (1984, U.K.) <sup>33, 34</sup> reported a 3 percent recurrence rate during the same follow-up period in 53 patients.

Levine and DeWolf<sup>20</sup> (1987, U.S.A ) reported an over-all success rate of 93 percent in 28 hydroceles during mean follow-up of 15 months. The criterion for successful sclerotherapy was defined as at least a 90 percent reduction of the original size plus patient satisfaction. Sigurdsson et al<sup>23</sup> (1993, Sweden) reported a over-all cure rate of 87 percent in 63 hydroceles (primary cure rate = 67 percent) treated with 3 percent podilocanol. The mean follow-up period was <sup>14</sup> months. The polidocanol has an extra benefit of being local anesthetic. Tammela et al<sup>18</sup> (1992, Finland) reported a over-all cure rate of 98 percent (primary cure rate = 68 percent) in 102 cases of hydrocele which were treated with 5 percent ethanolamine oleate.

Complications after sclerotherapy of the acquired hydroceles have been very few. Pain, hematoma, inflammation, thickening of the tunica, allergy and syncope have been reported<sup>18, 20, 32-35, 54</sup>. In earlier series, 0- 79 percent of the patients have experienced pain<sup>14, 15, 18, 21, 54</sup>. Pain after the injection sclerotherapy was the most common side effect in our series. Of the 95.12 percent hydroceles (no = 39) cases of our series who experienced pain after sclerotherapy, 82.92 percent (no = 34) had mild testicular or hypogastric or loin pain and 2.44 percent (no = 1) had moderate pain and 9. 76 percent (no = 4) had severe testicular and loin pain. To simplify the assessment of the pain, we have graded the pain severity as mild pain which is controlled by paracetamol only, moderate pain which needed ibuprofen tablets other than paracetamol and severe pain which needed injection diclofenac. No correlation between the amount of sclerosant injected or the ratio of aspirated fluid / injected sclerosant and pain was found. So obviously pain was not dose related and this was also observed by other authors<sup>15</sup>. Some authors<sup>17, 18, 20, 23</sup> have found that younger

patients have more unfavourable outcome than older patients and experienced more pain after the injection sclerotherapy. The present study did not support these findings. All of our patients were below 60 years. Possible interpretation of the fact that pain was not dose related is that pain was provoked when the sclerosant leaked out of the sac into the interstitium <sup>15</sup>.

Post-surgical complications seems to be equal or more frequent. Moloney <sup>32</sup> found 27 percent complication rate in a series of patients treated surgically. Bödker et al <sup>35</sup> reported 23 percent complication rate and a 17 percent recurrence rate after surgery. Stattin et al <sup>15</sup> reported 3 symptomatic late recurrence in a series of 113 hydroceles treated with sodium tetradecyl sulfate during a mean follow-up of 40 months. Nash <sup>33</sup> <sup>34</sup> reported three symptomatic recurrences in a series of 42 hydroceles treated with phenol and followed up 5 years. Tammela et al <sup>18</sup> had no recurrence in 102 hydroceles treated with ethanolamine oleate in mean follow-up of 46 months. Late recurrence is a rare problem after injection sclerotherapy of the hydroceles and even if it occurs, it can easily be controlled by a new injection. In our present study, patients were just followed up 6.51 months and no recurrence was noted during this short follow-up. It clearly indicate that ethanolamine oleate is an effective sclerosant. Tammela et al <sup>18</sup> reported that effect was permanent. However, six very large hydroceles (all bigger than 360 ml) were not cured after 3-4 sessions of the sclerotherapy. There is a transient reaccumulation of fluid owing to irritation of the sclerosant but, this gradually disappears or stabilizes at a decreased volume within 4-12 weeks <sup>18, 20, 23</sup>. So, there is no need to aspirate the fluid in the post-injection period and no treatment should be repeated before 3 months of sclerotherapy.

because, our first follow-up was after 1 month so our primary cure rate is just 34.14 percent (no = 14). The reported primary cure rate varies from 25 to 87 percent in the literature<sup>14, 15, 18-20, 23, 31-36</sup>. There has been some concern about treating hydroceles in reproductive age with sclerotherapy. Zimmerman et al<sup>52</sup> demonstrated in an experimental study in rabbits that sodium tetradecyl sulfate had an anti-fertility effect when administered intra-vaginal route before coitus. Osegbe<sup>53</sup> observed severe oligospermia in a series of 18 patients treated with oxytetracycline sclerotherapy. To our knowledge, ethanolamine has not been studied in this respect. Tammela et al<sup>18</sup> reported no changes in structure and size of testis by ultrasound in a series of a 102 hydroceles during average follow-up of 43 months. Biopsy of testis of three patients operated after the sclerotherapy did not reveal any change in testicular structure and spermatogenesis and fibrosis histologically. As testicular malignancy can be easily ruled out by ultrasound, even young patients with hydroceles can be treated by injection sclerotherapy because it has no harmful effects on the testis and epididymis as in an operation<sup>18, 27</sup>.

As injection sclerotherapy does not need operation theatre facility, regional or general anesthesia and hospitalization, it is a safe cost effective. Stattin et al<sup>15</sup> and Fracchia et al<sup>66</sup> calculated the cost of sclerotherapy was approximately 1 / 9 of the cost of in-patient surgery, not taking time off work into account.

## Conclusion

Five percent ethanolamine oleate injection sclerotherapy of the primary vaginal hydrocele is a reasonable and easy alternative to surgical treatment with good patient compliance and low recurrence rate. In developing countries where medical resources and surgical manpower are limited, injection sclerotherapy may be recommended as the alternative therapeutic option for the primary vaginal hydrocele in adults.



## Bibliography

1. Rodríguez WC, Rodríguez DD and Fortiño RF. The operative treatment of hydrocele: a comparison of 4 basic techniques. *J Urol* 1980; **125**: 804-5
2. Lord PH. A bloodless operation for the radical cure of idiopathic hydrocœle. *Br J Surg* 1962; **51**: 914-6
3. Wilkinson JL. An operation for large scrotal hydrocele. *Br J Surg* 1973; **60**: 450-2
4. Dahl DS et al. Lord's operation for hydrocele compared with conventional techniques. *Arch Surg* 1972; **104**: 40-1
5. Jhavar PK and Sharma LS. Surgery of hydrocele (a simplified minimal dissection technique). *Ind J Surg* 1979; **41**: 700-4
6. Atanasova D et al. A method for external & internal fenestration in the surgical treatment of idiopathic hydrocele. *Khirurgiia Sofia* 1989; **42**: 100-4
7. Falandryl L. Idiopathic hydrocele in adults: cure by vaginal fenestration. *Presse Med* 1992; **21** (43): 2094-6
8. Falandry L. A simple alternative technique in the treatment of idiopathic hydrocele in adults: vaginal fenestration. *Prog Urol* 1995; **5** (4): 568-74
9. Falandry L. A simple alternative method in the treatment of idiopathic hydrocele in adults: vaginal fenestration. *Prog Urog* 1995; **5** (1): 69-73
10. Ho GT et al. Endoscopic hydrocele ablation. *J Urol* 1992; **148** (6): 1911-3
11. Ho GT et al. Efficacy of endoscopic hydrocele ablation. *J Endourol* 1993; **7**(1): 71-4
12. Nishiyama I and Terunuma M. Endoscopic hydrocele ablation. *Hinyokika Kiyo* 1994; **40** (2): 125-26

13. Londes RR and Leonhardt K. The history of hydrocele. *Urol Survey* 1967; 17: 135
14. MacFarlane JR. Sclerosant therapy for hydroceles and epididymal cysts. *Bri J Urol* 1983; 55 (1): 81-2
15. Stattin P, Karlberg L and Damber JE. Longterm outcome of patients treated for hydrocele with the sclerosant agent sodium tetradecyl sulphate. *Scand J Urol Nephrol* 1996; 30 (2): 109-13
16. Hellstrom P et al. Sclerotherapy for hydroceles and epididymal cysts with ethanolamine oleate. *Ann Chir Gynaecol* 1986; 75 (1): 51-4
17. Hellstrom P et al. Ethanolamine oleate as a sclerosant for testicular hydroceles and epididymal cysts. *Bri J Urol* 1998; 62 (5): 445-8
18. Tammela TL et al. Ethanolamine oleate sclerotherapy for hydroceles and spermatoceles: a survey of 158 patients with ultrasound follow up. *J Urol* 1992; 147 (6): 1551-53
19. Bullock N and Thurston AV. Tetracycline sclerotherapy for hydrocele and epididymal cysts. *Bri J Urol* 1987; 59 (4): 340-42
20. Levine LA and DeWolf W. Aspiration and tetracycline sclerotherapy of hydrocele. *J Urol* 1998; 139 (5): 959-60
21. Musa MT, Fahal AH and El Arabi YE. Aspiration sclerotherapy for hydroceles in the tropics. *Bri J Urol* 1995; 76 (4): 488-90
22. Lund L and Bartolin J. Treatment of hydroceles testis with aspiration and injection of polidocanol. *J Urol* 1992; 147 (4): 1065-66
23. Sigurdsson T et al. Polidocanol sclerotherapy for hydroceles and epididymal cysts. *J Urol* 1994; 151 (4): 898-901

24. Mizoguchi H et al. Sclerotherapy with 3% polidocanol for hydrocele testis. *Nippon Hinyokika Gakkai Zasshi* 1995; 86 (12): 1757-60
25. Savion M, Wolloch Y and Saviv A. Phenol sclerotherapy for hydrocele: a study in 55 patients. *J Urol* 1989; 142 (6): 1500-1
26. Ozdemir E. Sclerotherapy of testicular hydroceles with 3percent aqueous phenol. *Hinyokika Kyo* 1996; 42 (6): 427-32
27. Gupta KC, Kala PC. Sclerotherapy for hydrocele. *Ind J Surg* 1983; 45: 470-1
28. Rinker JR, Allen L. A lymphatic defect in hydrocele. *Am Surg* 1951; 17: 681
29. Witte CL, Witte MH, Drach GW, Butler C. On the proteins of hydrocele fluid. *Surgery* 1973; 73: 347-52.
30. Gupta RL. Sclerotherapy for vaginal hydroceles. In: *A Review of Recent Progress in Surgery*, First edition, Edited by RL Gupta , Jaypee Brothers, chapter 1, pp 47-48, 1995.
31. Mohanty NK, Shah I and Kachroo SL. Aspiration sclerotherapy with tetracycline as an alternative to surgery in the management of primary hydroceles of the testis. *Ind J Surg* 1991; 53: 33-37
32. Moloney GE. Comparison of results of treatment of hydroceles and epididymal cysts by surgery and injection. *BMJ* 1975; 3: 478-79
33. Nash JR. Sclerotherapy for hydroceles and epididymal cysts. *Bri J Surg* 1979; 66: 289
34. Nash JR. Sclerotherapy for hydroceles and epididymal cysts: a five year study. *BMJ* 1984; 288: 1652
35. Bodker A, Sommer W, Anderson JT and Kristensen JK. Treatment of hydrocele of testis with aspiration and injection of tetracycline. *Bri J Urol* 1985; 57: 192

36. Wallace AF. Aetiology of the idiopathic hydrocele. *Bri J Urol* 1967; 32: 79
37. Fowler CG. The testis and scrotum. In: *Bailey and Love's Short Practice of Surgery*, 22nd edition. Edited by CV Mann, RCG Russel and NS Williams. ELBS with Chapman and Hall, chapter 61, pp 999-1010, 1995
38. Liang C, Wang K and Chen J. Epidemiological study of external genital diseases in 5172 adolescents. *Chuag Hua I hsuch tsa China* 1997; 77: 15-17
39. Cadwallander R. Hydrocele family. *Med Rec NY* 1895; 48: 383
40. Yates BJG. *Practioner* 1956; 177: 284
41. Ozdilek S. The pathogenesis of idiopathic hydroceles and a simple operative technique. *J Urol* 1957; 77: 282
42. Stewart BH. Surgery of the scrotum and its contents. In: *Cambel's Urology*, fourth edition. Edited by JH Haeelson, RF Gittes, AD Perlmutter, TA Stamey and PC Walsh. Philadelphia: WB Saunders Co., volume III. Sector XV, chapter 84, pp.2473-2498, 1979.
43. Hunter J (1786-870). "*Lectures upon the Principles of Surgery*". Collected by Palmer, London, 1835, pp454-57.
44. Andrews EW. The "bottle operation" method for the radical cure of hydrocele. *Ann Surg* 1907; 46: 915
45. Jaboulay M. *Chirurgie des centres nerveux, des viscères et des membres*. Lyon, *Storck* 1902; 2: 192
46. Solomon AA. The extrusion operation for hydrocele. *N Y State J Med* 1955; 55: 1885
47. Wilkinson JL. An operation for large scrotal hydrocele. *Bri J surg* 1973; 60: 450
48. Wilson WW. Injection treatment of hydroceles. *Lancet* 1949; 1: 1042-49

49. Albrecht W, Höltl W and Aharinejad S. Lord's procedure – the best operation for hydrocele ? *Bri J Urol* 1991; 68: 187
50. Kaye KW Clayman RV and Lange PH. Outpatient hydrocele and spermatocele repair under local anesthesia. *J Urol* 1983; 130: 369
51. Lindskog BI. Inguinal versus scrotal approach in the operative treatment of hydrocele. *Scand. J Urol Nephrol* 1968; 2: 211
52. Zimmerman RE, Nevin RS, Allen DJ, Tones CD, Goettel ME, Burk PJ. Anti-fertility effects of sodium tetradecyl sulfate in rabbits. *J Reprod Fertln* 1983; 68: 257-63
53. Osegbe DN. Fertility after sclerotherapy for hydroceles. *Lancet* 1991; 337: 172
54. Hu KN, Khan AS, Gonder M. Sclerotherapy with tetracycline solution for hydroceles. *Urology* 1984; 24: 572-76
55. Orbach EJ and Petretti AK. The thrombogenic property of foam of a synthetic anionic detergent (sodium tetradecyl sulfate N.N.R.). *Angiology* 1950; 1(3): 237-43
56. Robinson RM and Bolooki H. Intrapleural tetracycline for the control of malingnant pleural effusion. *Southern Med J* 1972; 62: 47-49
57. Rencken et al. Comparative trial of sclerotherapy for hydroceles. *Bri J Urol* 1990; 65(4): 382-4
58. Shokeir AA et al. Tetracycline sclerotherapy for testicular hydroceles in renal transplant recipients. *Urology* 1994; 44(1): 96-99
59. Bradlid KC and Moss DI. Long-term experience with sclerotherapy for treatment of epididymal cyst and hydrocele. *Aust N Z J Surg* 1996; 66(4): 222-4

60. Andersen M and Betsen G. Sclerotherapy of spermatoceles and hydroceles: Long-term results of polidocanol use. *Didssler Nor Laegetren* 1993; 113 (25): 3146-7
61. Fuse H et al. Sclerotherapy of hydroceles with polidocanol. *Int J Urol Nephrol* 1994; 26 (2): 199-204
62. Spence RAJ, Anderson JR and Johnston GW. Twenty-five years of injection sclerotherapy for bleeding varices. *Bri J Surg* 1985; 72: 195
63. Dimbe M, Norlen H, Zachrisson L and Lindholm H. Testicular hydrocele treated by bismuth phosphate injection. *Int J Urol Nephrol* 1988; 20 (2): 155-57
64. Yamamoto M, Hibi H and Miyake K. A new sclerosant therapy for testicular hydrocele with aspiration and injection of OK-432. *Int J Urol Nephrol* 1994; 26(2): 205-8
65. Cecci M, Sepich CA, Pagni G, Ippolito C, Minervini R and Fiorentini L. Painless treatment of hydrocele: ELMA cream anesthesia and fibrin adhesive sclerotherapy. *Int J Urol Nephrol* 1997; 29(4): 457-59



5. Local examination

*Inspection*

Scrotal swelling right / left /both sides

Impulse on cough present / absent

*Palpation*

Impulse on cough present / absent

Fluctuation test present / absent

Transillumination test present / absent

6. Investigations

TLC DLC Hb%

ESR

Urine R/E blood sugar blood urea

USG Testes Rt. Testis Lt. Testis

- Size x x x cm. x x x cm.

- Echopattern

- Focal lesion

- Position of the testis Anterior / posterior Anterior/posterior

- Hydrocele Volume ml ml

7. Aspirated hydrocele fluid ml colour

8. Pain during the procedure scrotal/iliac/loin mild/mod/severe

9. Amount of 5% Ethanolamine 5 / 10 / 15 / 20 / 25 / 30 ml



10. First follow-up visit (1 month) Date:
11. Medical history
- Scrotal pain - mild / mod / severe Yes / no
- No. of Tab paracetamol Tablets
- Scrotal haematoma Yes / no
- Scrotal infection Yes / no
- Thickening of the tunica Yes / no
12. Local examination
- Inspection*
- Scrotal swelling right / left / both sides / none
- Impulse on cough present / absent
- Palpation*
- Local tenderness present / absent
- Fluctuation test present / absent
- Transillumination test present / absent
13. Recurrence of hydrocele yes / no
14. Repeat sclerotherapy not needed/needed (..ml, inj. EO= .. ml)
15. Pain during the procedure scrotal/hypogastric/loin-mild/mod/ sev.
16. Patient satisfaction satisfied / unsatisfied

17. Second follow-up visit (3 months)      date:
18. Medical history
- Scrotal pain:      Yes / no
- No. of Tab paracetamol      Tablets
- Scrotal haematoma      Yes / no
- Scrotal infection      Yes / no
- Thickening of the tunica      Yes / no
19. Local examination
- Inspection*
- Scrotal swelling      right / left / both sides / none
- Impulse on cough      present / absent
- Palpation*
- Local tenderness      present / absent
- Fluctuation test      present / absent
- Transillumination test      present / absent
20. Recurrence of hydrocele      yes / no
21. Repeat sclerotherapy      not needed/needed(...ml, inj. EO= .. ml)
22. Pain during the procedure      scrotal/hypogastric/loin-mild/mod/sev.
23. Patient satisfaction      satisfied / unsatisfied



# CONSENT FORM

Date: .....

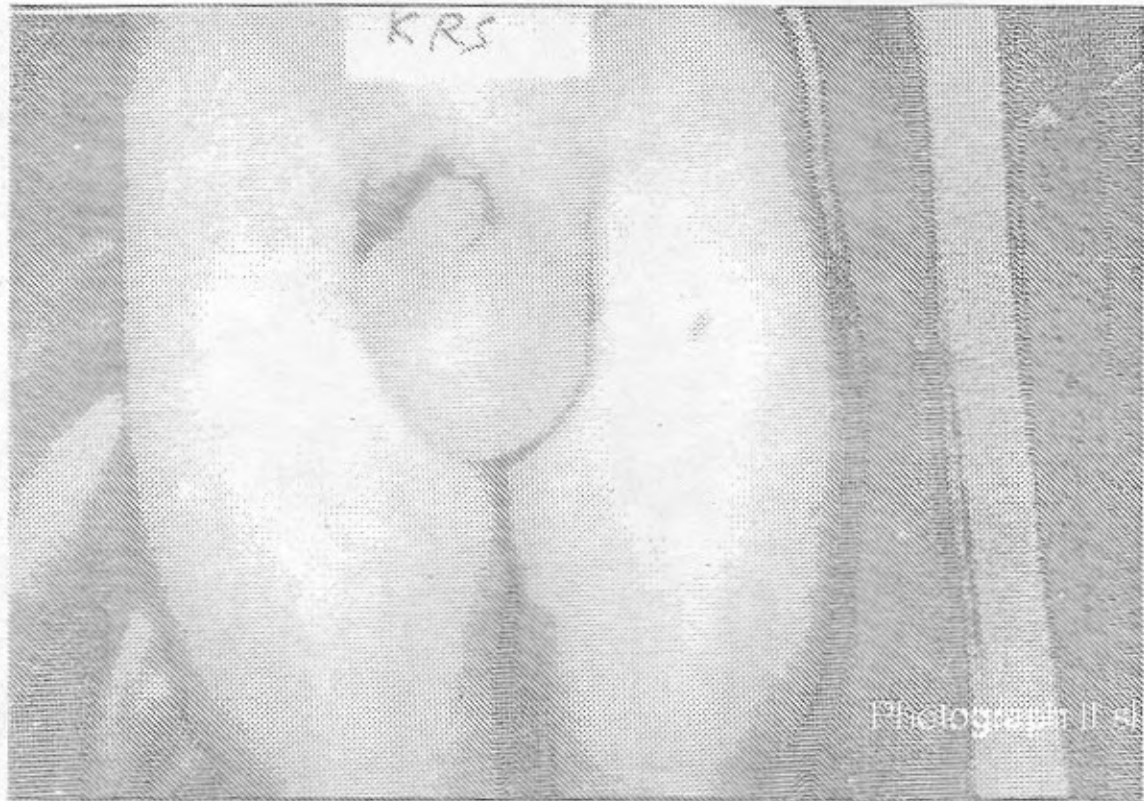
I agree that aspiration sclerotherapy or any other procedures, deemed necessary during surgery, be performed on ..... (name of the patient) under general/regional/local anesthesia. The doctors have explained the need for this procedure and the risks involved.

Signature of the witness  
Name :

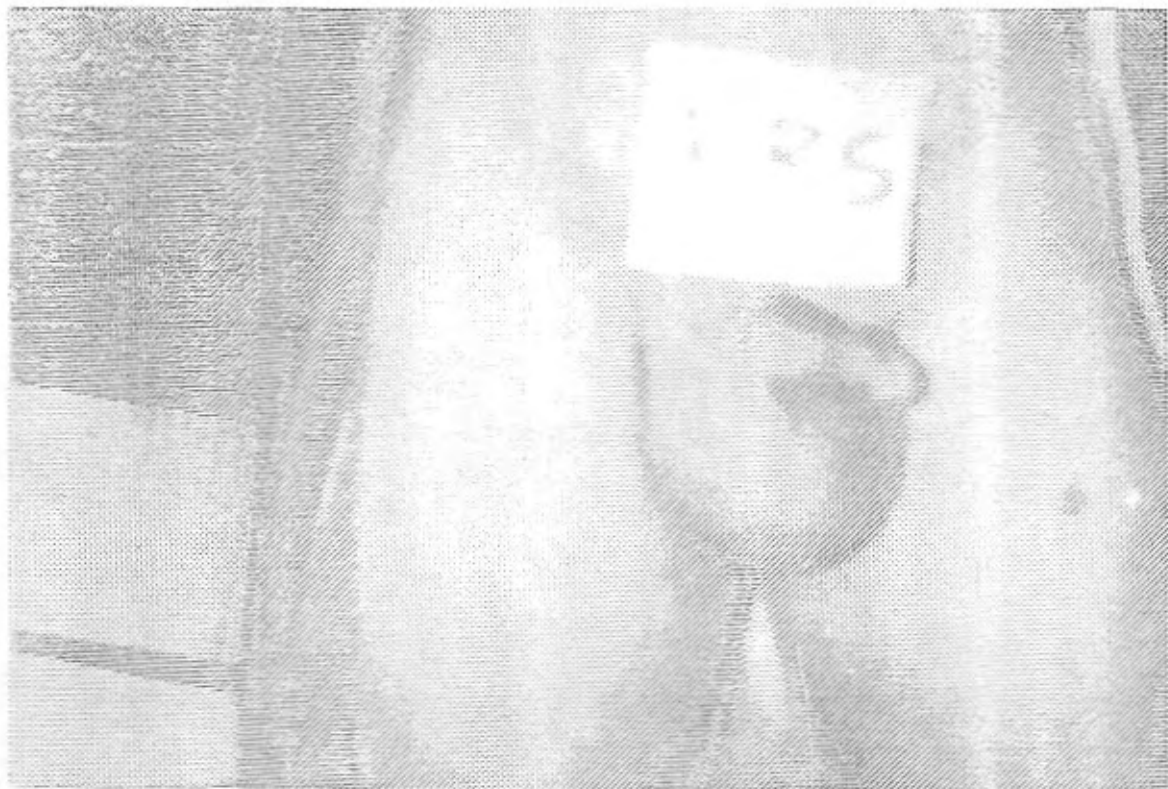
Signature of the patient  
Name:



Photograph I showing the sclerotherapy procedure



Photograph II showing the external genitalia with left hydrocele



Photograph III showing the external genitalia of the same patient after the sclerotherapy. Left hydrocele was cured.