

## **Effective Concentration of Povidone Iodine Renal Pelvis Instillation in the Treatment of Chyluria.**

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### **I. Introduction**

Chyluria is the presence of chyle in the urine. This has been recognized since the time of Charak (300 BC) who described it as 'Shuklameha' Hippocrates recognized and described chyluria (1, 2). Following discovery of the lymphatic circulation by JEAN Pecquet in 1651, Moellenbrogii (13) ascribed chylous urine to an abnormal junction of the lymphatic and urinary systems. Nearly 100 years later Otto wucherer, working in Brazil in 1866, found microfilaria in the urine of a patient with heamaturia. Wood in 1929 first demonstrated pyelolymphatic backflow in retrograde pyelography. KITTREDGE and Associates and others utilized lymphangiography to demonstrated the anatomic involvement seen in this condition. It is not uncommon in the Asia especially in India, Japan, Hong Kong and Tai wan. It is rare in western countries. (4.11). It is believed to occur as a result of communication between the lymphatics and the renal collecting system. (3, 5, 6, 11) Although not life threatening in most cases, it can be disturbing and sometimes debilitating if the chyle loss in urine is profuse. The disease is largely the chronic stage of filarial disease and is therefore an endemic disease.(7) Management includes conservative measures like avoidance of fat, anti filarial drugs etc; minimally invasive techniques like renal pelvic instillation of sclerosing agents and invasive procedures like renal decapsulation, retroperitoneoscopic nephron lympholysis etc.

Instillation of 1% silver nitrate into the renal pelvis has been the initial treatment modality if conservative measures failed. However, this procedure may be associated with serious complications like acute renal failure (8), life threatening hemorrhage (9) and death (10). Povidone iodine as a sclerosing agent has been shown to be effective and safe in the management of chyluria. Herein, we present our experience of treating chyluria with povidone iodine instillation in to the renal pelvis in the Department of Urology Stanley Medical College, Chennai, Tamilnadu, India.

### **II. Aim And Objective**

1. To determine the percentage of Povidone Iodine required for cure of chyluria after single dose renal pelvis instillation.
2. To compare efficacy of percentage of Povidone Iodine versus side effects

### **III. Materials And Methods**

Between September 2012 and April 2015, all patients who presented with complaints of milky white colored urine (chylous) were evaluated. Patients were asked to bring freshly voided urine in a transparent bottle. After inspection Ether test was done to demonstrate chyluria.

### **IV. Investigations**

Ether test

5cc of ether is added to 5 cc of urine added to see the solubility.

Urine - albumin

- Sugar

- Deposits

Urine culture and sensitivity

Blood

- TC

- DC

- ESR

Blood smear for microfilaria

Blood urea

Sr.Creatinine

Blood sugar

- fasting

- Post prandial

Ultrasound KUB

X ray KUB.

IVU done in selected cases who presented with

1. Haematuria
2. haemetochyluria.
3. Ultrasonogram showing subtle changes in the kidney
4. Episodes of febrile illness

### **Dietary Advice**

To avoid saturated fatty acids fatty diet - avoiding ghee,butter,ground nut oil.Advised to take sunflower oil.

### **Medical Treatment**

Diethylcarbazine (6 mg/kg Body weight) for - 3 weeks. restriction of strenuous activity. If urine culture was positive they were treated according to the sensitive drugs before povidone iodine instillation.

### **Study Design**

Our study is a prospective study undertaken in our institution from September 2015 to April 2015. Ethical committee approval was obtained and around 72 patients with chyluria are stratified into 4 groups as stated below. The concentration of povidone iodine used

Group I - 0.5 % - 18 Patients

Group II -1 % - 18 Patients

Group III - 2.5 % - 18 Patients

Group IV -5%- 18 Patients

The commercially available form povidone iodine is 5 % It is diluted with distilled water to get the required concentration. For each patient povidone iodine from a newly opened bottle was used. Patients were selected according to registration in the order of 0.5, 1, 2.5, 5 % concentration.

## **V. Procedure**

On the day of procedure Patients were advised to take butter 25 gms with bread and if non vegetarian 2 boiled eggs 2-3-hours prior to cystoscopy. They were asked to collect urine and show it to us just before putting the patient on table. If the urine is clear then the procedure is postponed. If the urine is chylous Injection Cefataxime 1 gram is given IV after test dose. Under local anesthesia with 20 F cystoscopes with 30 degree telescope was done with Normal saline for irrigation. The side of efflux was noted carefully. If reflux was found on both sides then right side is selected for treatment and the left side instillation after a period of 3 weeks with the same dose.

A 5 F ureteric catheter was passed into the selected ureter and Positioned in the pelvis. 5 - 7 ml of selected prepared concentration of povidone iodine was instilled into the renal pelvis slowly over a period of 1 to 2 minutes. During the procedure any pain or other reaction was noted. Patients were observed for 24hours and discharged the next day. At the time of discharge the following were noted

1. Fever
2. Loin pain
3. Haematuria.
4. Urine sample for culture.

All patients were reviewed after 3 weeks and if still symptomatic and the urine chyle is positive then the same procedure was repeated with the next higher concentration of povidone iodine on the same side in unilateral cases and in bilateral cases on both sides in 2 sittings with a time interval of 3 weeks. The maximum concentration used was 5 % and if there was no response then povidone iodine double wash was given i.e. 5 % given as usual followed by another wash after a time interval of 6 to 8 hours.If still not responding then we group them as refractory. All the cases were reviewed at 1, 3, 6 and 12 months.

## **VI. Observation**

### **Age Incidence**

A Total of 72 patients were included in this study, of these the maximum incidence of chyluria occurs between the third and fourth decade.

- |             |   |                    |
|-------------|---|--------------------|
| 1 patient   | - | less than 20 years |
| 13 patients | - | 20 to 30 years     |

25 patients	-	30 to 40 years
15 patients	-	40 to 50 years
12 patients	-	50 to 60 years
6 patients	-	60 to 70 years.

### **Sex Incidence**

Of the total 72 patients

Females - 44 / 72 patients (61.11 %)

Male - 28 / 72 patients (38.88 %).

The sex incidence ratio was almost 1.6: 1.

### **Presenting Complaints**

The duration of complaints of passing milky urine varied from 1 month to 20 years and most of the patients had symptom free interval in between. Haematochyluria was present in 8 patients and history of passing chylous clots was found in 11 patients. Obstructive voiding symptoms were found in 3 cases. Acute urinary retention was found in 3 cases. Of the 28 male patients 2 has bilateral hydrocele and none of the 72 patient had filarial limbs.

### **Cystoscopy Findings**

chylous efflux On the right side - 27 cases

chylous efflux on the left side - 23 cases

chylous efflux bilateral - 22 cases.

### **Urine Culture- Positive**

Total - 7 cases

E.Coli - 5 cases

proteus - 1 case

klebsiella - 1 case

Renal function was normal in all patients. Of the 72 patients 2 were diabetic and after povidone iodine instillation there was no significant side effects. Disappearance of chyle after 3 weeks of Povidone Iodine instillation was noted as success. Appearance of chyle at any time during the study period was considered as failure.

Group I

Povidone iodine concentration - 0.5 %

Total number of cases -18 cases

Success - 13 cases

Failure - 5 cases

Percentage of success - 72.22 %

Complications

immediate - nil

Late - nil

Group II

Povidone iodine concentration -1%

Total number of cases - 18 cases

Success - 7 cases

Failure - 11 cases

Percentage of success - 33.33 %

Complications

immediate - nil

Late - nil

Group III

Povidone iodine concentration - 2.5 %

Total number of cases - 18 cases

Success - 15 cases

Failure - 3 cases

Percentage of success - 83.33 %

Complications

immediate - nil

Late - nil  
Group IV  
Povidone iodine concentration -5%  
Total number of cases - 18 cases  
Success - 17 cases  
Failure - 1 case  
Percentage of success - 94.44 %  
Complications  
immediate - severe pain (38.8 %)  
Late - nil

Of the 20 failures 8 cases had bilateral reflux and 12 had unilateral reflux. Failure was not influenced significantly by unilateral or bilateral reflux. In our study of 72 cases no patient developed anaphylaxis following povidone iodine instillation. In our study 2.5 % concentration of povidone iodine has more success rate (83.33 %) with no significant side effects.

## VII. Discussion

Yamauchi (11) has reported the usual occurrence of chyluria between the second and fifth decade of life. In our study out of 72 patients 54 were in between the second and fifth decade of life. (75 %). According to Torres and associates, no sex predominance exists (42). In our study out of the 72 patients 44 were females and 28 were male. The sex incidence ratio was 1.6: 1. The duration of symptoms ranged from 2 month to 20 years. Most of them had symptom free interval in between. The symptom free interval varies from months to years. Shanmugam used single instillation of .2 % povidone iodine in five patients and there was no recurrence in 6 months follow up. (10) Singh had studied two-types of dosage schedule in chyluria patients. In the first protocol, 8 h instillation of the povidone iodine was done for 3 days (total of nine doses) while in the second protocol weekly instillation of the povidone iodine was done for 6 weeks. The total number of patients included in the study was 27 in first protocol and 25 in the second protocol. At median follow-up of 32 months in 8 h instillations group there was 85% response rate with mean disease free duration of 27 months. While in weekly instillation group a response rate of 75% with disease free duration of 22 months were observed. (88) Shailendra conducted a randomized prospective and comparative study to evaluate the efficacy and toxicity of 1% silver nitrate, 0.2% povidone iodine and 50% dextrose as RPIS for treating chyluria. The dextrose treatment was discontinued at mid-term because of poor success. Of 85 patients, 44 received silver nitrate and 41 povidone iodine; both groups were well-matched and the mean follow-up was 28.4 and 23.3 months, respectively. 'Immediate clearance' was recorded in 91% and 98%, and recurrence in 21% and 22% of patients after the first course of RPIS, after silver nitrate and povidone, respectively; Kaplan-Meier estimates of 'disease-free duration' in the two groups (23.6 vs 20.1 months) were also similar (P = 0.7906). The cumulative success rate after two courses of RPIS was 82% (silver nitrate) and 83% (povidone; P = 0.1). Five (11%) patients in the silver nitrate and one (2%) in the povidone group had significant flank pain during treatment. He concluded that Povidone iodine 0.2% is as effective for RPIS as 1% silver nitrate.

In our study 5 % Povidone iodine concentration (Group IV) had a Success rate of 94.44 % with severe pain as immediate Complication (38.8 %). with a recurrence rate of 5.6 %. With 2.5 % Povidone iodine concentration (Group III) the Success rate was - 83.33 % with recurrence 16.67. The manifestation of chyluria depends upon the site of involvement and the anastomotic variation of lymphatic system in the individual patient. The anastomotic variation primarily occurs at the cisterna chyli where the lumbar trunks and the intestinal trunks join. The classical cisterna chyli is seen in only about 47% of normal individuals, and the intestinal trunk in such cases drains in the lumbar trunks of one side or directly in the thoracic duct either as a single trunk or as multiple smaller ones. This may explain the presence of unilateral chylous oedema of only one extremity or unilateral chyluria. The unilateral findings are more common on the left side.(76,77) In our study of the 72 cases chylous efflux on the right side was for 27 cases and for the left side 23 cases and bilateral efflux in 22 cases with a ratio of the ratio Right : left - 1.17 : 1 with a slight shift to right side.

## VIII. Summary

Between September 2012 and April 2015 all patients of chyluria were studied with single dose renal pelvis instillation of Povidone Iodine 5 % Povidone Iodine had the best success rate in clearing chyluria (94.4 %). The most common complication was severe pain which occurred in 38.8 %) 2.5 % Povidone Iodine had a success rate of 83.33 % with no significant during and after the procedure. 1 % Povidone Iodine had the most failure. The success rate was 33.33 %. which was worse than .5 % Povidone Iodine. There was no significant complication. we cannot come to a conclusion why this variation happened. 0.5 % Povidone Iodine had a the success rate of 72.2 % with no significant complications.

## IX. Conclusion

We conclude that 2.5 % Povidone Iodine single pelvis instillation is the ideal dose, which gives good success with no major complications

## Bibliography

- [1]. LAZARUS, J.A. and MARKS, M.S. Non parasitic chyluria with special reference to Traumatic chyluria J. UROL 56: 246-258 (AUG) 1946.
- [2]. LLOYD-DAVIES, R.W., EDWARDS J.M., and KINMONTH, J.B., CHYLURIA. A Report of five cases with particular reference to Lymphography and Direct surgery. Brit J. UROL 39:560-570 (oct) 1967)
- [3]. Yu HHY, Ngan H, Leong CH. Chyluria-a 10-year follow up. Brit J Urol 1978; 50:126-33.
- [4]. Karanjavala DK. Technique of clearance (or disconnection) of dilated lymphatics in renal hilum and lower ureter and bladder in cases of in tractable chyluria or haemochyluria. Brit J Urol 1979; 51:440-2.
- [5]. Chang CY, Lue YB, Lapidus J. Surgical treatment for chyluria. J Urol 1973; 109:299-301.
- [6]. Callagan, DH, Graf EC, Gersack J, Turbow AM. Lymphangiography and simultaneous excretory urography as a diagnostic aid in chyluria. J Urol 1965; 93:417-9.
- [7]. Ohyama C. Spontaneous remission of chyluria. J Urol 1979; 121:316-7.
- [8]. Srivastava DN, Yadav S, Hemal K, Berry M. Arterial hemorrhage following instillation of silver nitrate in chyluria-treatment by coil embolisation. Australas Radiol; 42(3):234-5:1998
- [9]. Mandani A, Kapoor R, Gupta RK, Rao HS. Can silver nitrate instillation for treatment for chyluria be fatal? Br J Urol; 82 (6), 926-7:1998
- [10]. Shanmugam TV, Prakash JV, Shivashankaran G. Povidone iodine used as sclerosing agent in the treatment of chyluria. Br.J.Urol; 82 (4):587; 1998
- [11]. Yamauchi S. Chyluria: clinical, laboratory and statistical study of 45 Personal cases observed in Hawaii. J Urol 1945; 54:318.
- [12]. Okamoto K, Ohi Y. Recent distribution and treatment of filarial chyluria in Japan. J Urol 1983; 129:64-7.
- [13]. MOELLENBROGII, U, A.: Cited by Sanes K.I. and KAHN.M: ON nonparasitic chyluria Arch, Int.Med.17:181-192 (FEB) 1916.
- [14]. CAHILL, K.M.Filarial Chyluria: A Biochemical and Radiological Study of five patients. J. TROP, MED 68:27-31. Fweb 1965.
- [15]. JOHNSTON, D, W.: CHYLURIA; CASE REPORT AND REVIEW OF LITERATURE ANN, Int med, 42:931-937 (Apr) 1955.
- [16]. YAMAUCHI, S.CHYLURIA; Clinical laboratory and statistical study of 45 personal cases observed in HAWAII. UROL 54:318-347(Sept) 1945.
- [17]. KOEHLER P.R. Chiang, T.C.Lin C.T., Chen, K.C. and Chen, K.Y., Lymphography in chyluria Am.J. Roentgenol 102:455-465 (Feb) 1968.
- [18]. KUTZMANN, A, A. Non parasitic chyluria ANN sur. 82:765-780 (Nov) 1925.
- [19]. SERVELLE, M., TURIAF J., ROUFFILANGE, H., SCHERER, G., PERROT, H., FRENTZ, F., AND TURPYN, H.: Chyluria in abnormalities of the Thoracic duct, Surgery 54 536-549 (SEPT) 1963
- [20]. EHRILICH, R.M., HECHT, H, L., ANDVEENEMA, R.J, chyluria following Aorto iliac Bypass Graft: A unique method of Radiologic Diagnosis and Review of the Literature J.UROL 107 302-303 (FEB) 1972.
- [21]. WIGGELINKHUIZEN, J., LANDMAN, C., and GREENBERG, E., CHYLURIA. AM J.DISCHILD 124:99-101. (July) 1972.
- [22]. Karanjavala D.K. Technique of clearance (or disconnection) of dilated lymphatics in renal hilum and lower Ureter and Bladder in cases of intractable chyluria or haemochymuria BRIT. J. UROL, 51:44 1979.
- [23]. KISHIMOTO, T. HIGUCHI, T., ENDO, M. and KAI, Y.: Lymphography in patients with unilateral chyluria J. UROL 92: 574-578 (NOV). 1964.
- [24]. Callahan, O.H. GRAF, E.C. GERSACK, J., AND TURBOW, A.M. Lymphangiography and simultaneous excretory urography as a Diagnostic aid in chyluria J.UROL 93: 417-419 (mar) 1965.
- [25]. KITTREDDGE R.D. HASHIM S., S ROHOLT, H.B. VANITALLIT., T.B. and FINBY, : Demonstration of Lymphatic abnormalities in a Patient with chyluria Am.J. ROENTGENOL 90:159-165 (July) 1963.
- [26]. LILLIE O.R., AND FOX, G.W. Traumatic Intra Thoracic Rupture of the thoracic duct with chylothorax Ann, Surg, 101:1367- 1376 (JUNE) 1935.
- [27]. KITAGAWA, M and OHMORI, S. cited by YAMAUCHI, s. 28. LOWSLEY, O.S., AND KERWIN, t.j.: CHYLURIA, IN: CLINICAL Urology Baltimore, Williams & Wilkins Company 1956.
- [28]. P.C. Rajaram-Lymphatic Dynamic in filarial chyluria and prechyluric state. Lymphographic Analysis LYMPHOLOGY 3 (1970), 114-127.
- [29]. KINMPNTHJ.B. AND TAYLOR G.W. Chylous Reflux Brit.M.J.I:529- 533 () 29 FEB) 1964.
- [30]. POMERANTZ.M. and PULLAR, T.H. True non parasitic chyluria with LYMPHANGIOGRAPHIC abnormalities J.A.M.A. 196:452- 454 (2 MAY)
- [31]. COOKSON, H.A., AND PULLAR T.H. True nonparasitic chyluria associated with enstuation. Report of a case, ARCH INT, MED, 878-884 (JUNE) 1934.
- [32]. Gagon, J. h> Lymphography in Filariachyluria J. Canad. Assoc Radiologists, 25:319-323 (Dec) 1974
- [33]. KO, U.K., AYE, T.T AND AUNG, S.T.T: CHYLURIA clin. Radiol. 26:237-242 (April) 1975,
- [34]. COCKETT, A, T.K., and GOODWIN W.E. CHYLURIA Attempted Surgical Treatment by Lymphaticovenous anastomosis J.UROL, 88(566-568) (Oct) 1962.
- [35]. ORTIA, F., WALZAKM.P. and MARSHALL., V.F. CHYLURIA LYMPHATICA-URINARY FISTULA Demonstrated by lympharangiography J. UROL 91. 608-612 (May) 1964.
- [36]. WOOD A.H. Unilateral Renal chyluria J. UROL, 21 109-117 (Jan) 1929
- [37]. LANG E.K. REDETZKI, J.E., AND Brown, R.L., Lymphangiographic demonstration of lymphaticocolic fistulas Causing chyluria (?Filariasis J.UROL 108: 321-324 (Aug) 1972.
- [38]. OHYAMAC.SAITAH.MIYASATO.N: Spontaneous remission of chyluria J. UROL 1979; 121:316
- [39]. KATAMINED D. Supplement to pathogenesis of filarial chyluria. Nagasaki Med. J., 27:213, 1952.
- [40]. OKAMOTO K.OHIY: Recent distribution and treatment of filarial chyluria in JAPAN J.UROL, 1983; 129:64
- [41]. TORRES L.F., AND ESTRADA, k., Jr.: Experiences in the treatment of chyluria J.UROL. 87: 73-76 (JAN) 1962.
- [42]. YU, H.H.Y., NGAN H. nadleong, c.h. chyluria a 10 year follow up. BRIT.J. UROL, 50: 126, 1978.

- [43]. Maged A. Re nalchyluria. Brit J Urol 1967; 39:555-9.
- [44]. Akisada M, Tani S. Filial chyluria in Japan. Lymphography, etiology, and treatment of 30 cases. Radiology 1968; 90:311-7.
- [45]. Prasad PB, Chaudhary DK, Barnwal SM, Jha S, Bharthuar A. Periureteric lymphovenous stripping in cases of chylohematuria - Report of 15 cases (Patna Operation). Indian J Surg 1977; 39:607
- [46]. Hemal AK, Gupta NP. Retroperitoneoscopic lymphatic management of intractable chyluria. J Urol 2002; 167:2473-6. 3. Jiang J, Zhu F, Jin F, Jiang Q, Wang L. Retroperitoneoscopic renal pedicle lymphatic disconnection for chyluria. Chin Med J (Engl) 2003; 116:1746-8.
- [47]. Gomella LG, Shenot P, Abdel-Meguid TA. Extraperitoneal laparoscopic nephrolysis for the treatment of chyluria. Br J Urol 1998; 81:320-1.
- [48]. Chiu AW, Chen MT, Chang LS. Laparoscopic nephrolysis for chyluria: case report of long-term success. J Endourol 1995; 9:319-2.
- [49]. Punekar SV, Kelkar Ar, Prem AR. Surgical dissection of lymphorenal communication for chyluria: a 15 years experience. Br J Urol 1997; 80:858-63.
- [50]. Suresh Bhat, T.A. Kishore, Hari Govindan, K.M. Dinesan, Felix Cardoza: The Efficacy And Safety Of Povidone Iodine In The Management Of Chyluria. The Internet Journal of Urology. 2005. Volume 2 Number 2.
- [51]. Brunkwall J, Simson O, Berquist D, Jonsson K, Bergentz SE. Chyluria treated with renal autotransplantation: A case report. J Urol 1990; 143:793-6.
- [52]. Hou LQ, Liu QY, Kong QY, Luo CZ, Kong QA, Li LX, et al . Lymphonodovenous anastomosis in the treatment of chyluria. Chin Med J Eng 1991; 104:392-4.
- [53]. Ji YZ, Zheng JH, Chen JN, Wu ZD. Microsurgery in the treatment of chyluria and scrotal lymphangial fistula. Br J Urol 1993; 72:952-4.
- [54]. Xu YM, Ji RJ, Chen ZD, Qiao Y, Jin NT. Microsurgical treatment of chyluria: A preliminary report. J Urol 1991; 145:1184-5.
- [55]. Takigawa H, Kagawa S, Aga Y, Uema K, Sumiyoshi Y, Inai T, et al . Renal artery thrombosis following surgical treatment of chyluria. Hinyokika Kyo 1988; 34:1631-4.
- [56]. Zhao WP, Hou LQ, Shen JL. Summary and prospects of fourteen years' experience with treatment of chyluria by microsurgery. Eur Urol 1988; 15:219-22.
- [57]. Cockett AT, Goodwin WE. Chyluria: attempted surgical treatment by lymphatic-venous anastomosis. J Urol 1962; 88:566-8.
- [58]. Chinesta SS, Tormo BF, Jabaloyas MJM, Cruz JF. Percutaneous treatment of renal cysts with iodinated povidone injections. Long term clinical course. Actas Urol Esp. 1997; July-Aug (7):662-7.
- [59]. Chandrashekar D, Meyyappan RM, Rajaraman T. Instillation of povidone iodine to treat and prevent lymphocele after renal transplantation. Br J Urol. 2003; 91:296
- [60]. Okamoto K, Ohi H. Recent distribution and treatment of filarial chyluria in Japan. J. Urol. 1983; 64:1929.
- [61]. Koo CG, Langenberg V. Chyluria: A clinical study. J Roy Coll Surg 1971; 14:3.
- [62]. Chen KC. Lymphatic abnormalities in patients with chyluria. J Urol 1971; 111:106.
- [63]. Date A, John TJ, Chandy KG, Rajagopalan MS, Vaska PH, Pandey AP, et al. Abnormalities of the immune system in patients with chyluria. Pediatrics 1980; 66:792-4.
- [64]. Johnston DW. Chyluria. Case report & review of literature. Ann Int Med 1955; 42:931
- [65]. Diamond Eric, Schapira ME. Chyluria. A review of literature, Urology 1985; 26:427-31.
- [66]. Choi JK, Weidmer HS. Chyluria: lymphangiographic study and review of literature. J Urol 1964; 92:723.
- [67]. Koga S, Nagata Y, Arakaki Y, Matsuoka M, Ohyama C. Unilateral pedal lymphography in patients with filarial chyluria. BJU Int 2000; 85:222-31 1993.
- [68]. Haddad MC, Shahed AL, Sharif HS, Miola UJ. Case report. Invest Chylur Clin Radiol 1994; 49:137-9
- [69]. Thet-Thet Lwin, Takeda T, Kuramochi M, Sato M, Wu J, Myo-Min, et al. Tc-99m diethylenetriaminepentaacetic acid (DTPA) human serum albumin (HAS) radionuclide lymphography for detecting the location of chyluria. Ann Nucl Med 1998; 12:205-7.
- [70]. Nishiyama Y, Yamamoto Y, Mori Y, Satoh K, Takashima H, Ohkawa M, et al. Albumin Lymphoscintigraphy in chyluria. Clin Nucl Med 1998; 23:429-31
- [71]. Margaret H. Pui Tian-Chao Yueh. Lymphoscintigraphy in chyluria, chyloperitoneum and chylothorax. J Nucl Med 1998; 39:1292-6.
- [72]. Agarwal SK, Mitra MK, Mishra R, Sethi PP, Murthy PK, Chatterjee RK. Filarial Chyluria. An immunological and renal function study. J Assoc Phys India 1987; 35:425-7
- [73]. Date A, Shastry JC, Johny KV. Ultrastructural glomerular changes in filarial chyluria. J Trop Med Hyg 1979; 82:150
- [74]. Suhuki R, Morita H, Sugeno Y, Mizobuchi M, Yamamoto W, Ideura T, et al. A case report of chronic chyluria probably due to Bancroftian filariasis, which showed hypoproteinemia. Nippon Jinzo Gakkai Shi 2001; 43:63-8.
- [75]. Koo CG, Langenberg V. Chyluria: A clinical study. J Roy Coll Surg 1971; 14:3.
- [76]. Chen KC. Lymphatic abnormalities in patients with chyluria. J Urol 1971; 111:106.
- [77]. Nandy PR, Dwivedi US, Vyas N, Prasad M, Dutta B, Singh PB. Povidone iodine and dextrose solution combination sclerotherapy in chyluria. Urology 2004; 64 : 1107-10.
- [78]. Diamond Eric, Schapira ME. Chyluria. A review of literature, Urology 1985; 26:427-31
- [79]. Numez MC, Carcamo VP, de Cabo RM, Kabani MH, Martinez- Pineiro Caraumes JA. Recurrent Nonparasitic chyluria. Arch Esp Urol 1998; 51:932-4
- [80]. Cortvriend J, Van Nuffel J, Van den Bosch H, Van Erps P. Non-parasitic chyluria. A case report and review of the literature. Arch Urol Belg 1998; 66:11-5.
- [81]. Mc Mohan, Simonsen PE. In: J E Manson's tropical diseases. 12th edn. WB Saunders. London 1334-6.
- [82]. Subra R, Hebrard G. Ecology of Culex pipiens fatigans larvae in an area of high endemicity of Bancroftian filariasis. Tropenmed Parasitol 1975; 26:48-59
- [83]. Jones CG, Heathcote OH, Magayuka SA. Epidemiological study of infections in the mosquito: selective trapping of unfed malaria-filariasis vectors seeking a blood meal in bedrooms. Trans R Soc Trop Med Hyg 1972; 66:24
- [84]. Babu S, Blauvelt CP, Kumaraswami V, Nutman TB. Chemokine receptors of T cells and of B cells in lymphatic filarial infection: a role for CCR9 in pathogenesis. J Infect Dis 2005; 191:1018-26
- [85]. Miranda J, Maciel A, Souza RM, Furtado AF, Malagueno E. Proteic Profile and antigenic recognition of extracts from Wuchereria bancrofti L3 infective larvae. Rev Soc Bras Med Trop 2005; 38:27-32
- [86]. Meyrowitsch DW, Simonsen PE. Long-term effect of mass diethyl carbamazine chemotherapy on bancroftian filariasis: results at four year after start of treatment. Trans R Soc Trop Med Hyg 1998; 92:98-103
- [87]. Singh KJ, Srivastava A. Nonsurgical management of chyluria (sclerotherapy). Indian J Urol 2005; 21:55-58

- [88]. ShailendraGoel, Anil Mandhani, AneeshSrivastava, RakeshKapoor, Sanjay Gogoi, Anant Kumar, MahendraBhandari (2004) Is povidone iodine an alternative to silver nitrate for renal pelvic instillation sclerotherapy in chyluria? *BJU International* 94 (7), 1082-1085.