

Trichiasis recurrence in North Ethiopia: A one year prospective study of Trachomatous Trichiasis surgery done by integrated eye care workers

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Abstract

Background: Blindness due to trachomatous trichiasis can be prevented by simple eyelid surgery that can be performed by trained nurses.

Objective: To evaluate the post-operative outcome of posterior tarsal rotation done by integrated eye care workers (IECWs) at the twelfth postoperative month.

Methods: A prospective study to evaluate trichiasis surgery for recurrence was conducted in Yilmana Densa District. Trained IECWs did transverse tarsotomy with lid margin rotation for 455 patients with trichiasis following the standard procedure. Post-operative follow-up evaluation was done at the 12th month by IECWs who neither took part in the operation nor knew the specific surgeons for the corresponding patients.

Results: Out of 695 a total of 560 operated eyelids were available for follow-up just at the 12th month. In terms of persons, 79.3% (361/455) patients came for follow-up evaluation. The recurrence rate among the operated eyelids was found to be 16.6%. There was an increase in likelihood of having recurrence with increasing age of patients ($X^2=5.6$, $P=0.02$). We also found a statistically significant difference in rates of recurrence among patients operated by different surgeons ($X^2=12.8$, $P=0.005$).

Conclusion: Trichiasis recurrence following surgery done by non-ophthalmologists is low indicating the possibility of avoiding preventable blindness due to trachoma through the training of integrated eye care workers. Moreover, monitoring mechanism appeared essential to track the performance of IECWs. [*Ethiop.J.Health Dev.* 2008;22(1):8-13]

Introduction

The burden of blindness in developing countries is significant when compared to the developed countries. However, the causes of blindness in the developing countries are avoidable in the majority of cases (1-3). Cataract and blinding trachoma are the major causes of blindness in sub-Saharan Africa including Ethiopia. Worldwide, trachoma is estimated to affect 500 million people, most of who live in rural communities of the developing countries. Among these an estimated 6 million are suffering from visual impairment or blindness due to trichiasis. Thus, avoidable blindness caused by trachoma is imposing huge constraints on economic and social developments (4, 5).

Prevalence studies have identified trachoma as one of the leading causes of blindness in Ethiopia (6-8). Among the indicators of blinding trachoma in a community is the prevalence of trichiasis in people aged 15 years and above. According to World Health Organization criteria a prevalence of trichiasis 1% and above within a community indicates the burden of blinding trachoma to be significant and the need for mass surgical intervention in that community (4).

Surveys on active trachoma and trichiasis in four zones of Amhara Region, namely, North Gondar, South Gondar, East Gojjam and West Gojjam reported very high prevalence. The prevalence of active trachoma in

children 1-9 years of age was 60% and above whereas trichiasis in people aged 15 years and above was found to range between 4.5% and 7%. One of the districts severely affected by trachoma was Yilmana Densa, where six percent trachomatous trichiasis (TT) prevalence was documented (Unpublished Prevalence Survey Report).

The first step in the prevention of blinding trachoma is identifying communities with the problem and developing control strategies. Provision of simple eyelid surgery in trachoma endemic communities by non-ophthalmologists is affordable and essential to tackle the progressive corneal damage leading to blindness. With this in mind, the Amhara Regional Health Bureau, in collaboration with the Trachoma Control Program of the Carter Center, has been providing training for integrated eye care workers (IECWs) on the technique of eye lid surgery for the correction of entropion trichiasis.

In the correction of entropion trichiasis a number of different surgical procedures are reported to be effective (9). Nevertheless, depending on the degree of trichiasis, presence of active infection and repeated cycles of infection, there is always recurrence of trichiasis (10-12). In Ethiopia the two most commonly used methods are Bilamellar Tarsal Rotation (BTR) and Posterior Tarsal Rotation (PTR). A study conducted by Reacher M et al has shown BTR to be successful in 80% of minor trichiasis and 77% of major trichiasis (9). Comparative

studies done in Ethiopia showed that recurrence of trichiasis was similar in both types of surgery irrespective of the degree of trichiasis, ranging from 14% to 16% (12, 13). Also, a large community based comparative study did not show difference in outcome whether the procedure was done by ophthalmologists or non-ophthalmologists (10). The purpose of this study was to evaluate the outcome of Posterior Tarsal Rotation of the upper eyelids for trichomatous trichiasis when performed by IECWs.

Methods

Study design: A prospective study design was applied to evaluate the outcome of tarsotomy for TT at the twelfth post-operative month. Surgery was performed on 455 cases of TT from January 7- 22, 2005.

Study area: The study was conducted in Yilmana Densa district, in West Gojjam Zone, Amhara Regional State, Ethiopia. It is located 40 kilometers from Bahir Dar, the regional capital. According to the Central Statistical Authority, the projected population of the district as of 2005 was 326,139. There were two health centers in the district that had trained staffs as integrated eye care workers.

Sample size: The required sample size was calculated to be 480 using a single population proportion formula by making the following assumptions: 20% recurrence of trichiasis following tarsotomy (9, 10); 3.5% margin of error; 95% confidence interval; and 11,500 estimated populations of TT cases (Derived from Unpublished Prevalence Survey Report).

We enrolled patients identified to have trichiasis of the upper eyelid until the minimum required sample size was fulfilled. Patients were assigned to the IECWs whenever each TT surgeon was ready to do the surgery rather than at random. The exclusion criteria were history of previous surgery, trichiasis not due to trachoma, residence outside the district, unavailable for subsequent follow up, children who needed general anesthesia and the presence of systemic illness.

Data collection: Patients included in the study were registered in a standard format and were given code number. Data were collected on variables like patients' socio-demographic characteristics, preoperative grade of trichiasis, intra-operative complications, surgeons who performed the procedure (who were assigned codes), and post-operative findings at follow-up evaluation.

Preoperative procedure evaluation: Trained IECWs who would not do the surgery did the preoperative evaluation involving history taking (including history of epilation and previous lid surgery) and physical examination (including trichiasis grading and general medical examination for systemic illness). The IECW

graders involved in the study were selected based on their best performance in the Trachoma and Trichiasis prevalence study done in the Amhara Regional State. Inter-grader agreement level for trichiasis grading was not done. This was a limitation of this study.

Surgery: The type of procedure performed in this study was Posterior Tarsal Rotation. The surgeons performing the procedure were IECWs who were given refresher course on the surgical technique by an ophthalmologist. Surgery was done at two health centers with convenient geographical location for study subjects. Aseptic and standard technique was used. Topical 2% tetracycline and up to 3ml of 2% lidocaine with adrenaline was infiltrated into the neuromuscular plate for each lid. The surgery involved incision of the tarsal plate 3 mm above and parallel to the lid margin. The incision extended 1mm lateral to the lacrimal punctum and up to the lateral canthus. The suture used in this study was 4.0 silk. Immediately after the procedure, the operated eyes were dressed with eye pad after applying 1% tetracycline eye ointment.

Postoperative procedure evaluation:

Immediate post-operative evaluation was done on the next day to identify post-operative complications and the degree of surgical correction. During this evaluation, patients and accompanying family members were shown how to apply 1% tetracycline eye ointment and wash their faces. Then appointment for the removal of stitches, evaluation and correction of complications was given. Five patients with under-correction underwent re-correction surgery and were excluded from the study.

Subsequent follow-up examination at the twelfth postoperative month was conducted by IECWs at outreach clinics that were arranged by community health agents (CHAs). CHAs from the villages where surgically treated persons reside were gathered one week before the follow up period. Personal information identification was given to the CHAs for follow up, and were instructed to contact and refer each traced person to the nearest follow up clinic.

Successful post-operative outcome was defined as no history of epilation or no eyelash-eye ball contact in the primary position of gaze around the twelfth post-operative month.

Patients with recurrence underwent re-correction at the health centers. The IECWs who conducted the preoperative as well as follow-up evaluation were the ones who didn't participate in doing the surgery and were not aware of the specific surgeon who performed the surgery.

Research assistants were given orientation and training for three days with emphasis on the purpose of the study,

inclusion and exclusion criteria, data collection tools and techniques, preoperative evaluation, the standard surgical and post-operative evaluation techniques.

Data analysis: Data from the standard formats were entered into and analysed by Epi-Info 6.04 statistical software program. Percentages, odds ratios, and chi-square values were computed. P-value less than 5% was taken as significant.

Ethical considerations: In the first place, the proposal was approved by the regional and zonal health bureaus. Secondly, the objectives of the study and the procedures were explained to concerned local government officials and community leaders and written approval was obtained. Finally verbal consent was also given by patients before undergoing the surgery. For patients unable to give consent due to age or other reasons parents or close relatives were asked to give consent. Children who could not be operated under local anesthesia were referred to health facilities that could do the procedure under general anesthesia.

Operational definitions:

Minor trichiasis: 1-4 eyelashes touching the globe in primary gaze

Major trichiasis: 5 or more eyelashes touching the globe in primary gaze

Recurrence of trichiasis: one or more eyelashes touching the globe or history of epilation after surgery

Integrated eye care worker/ IECW (TT Surgeon): is a paramedic trained for one month to perform posterior tarsal rotation for trichomatous trichiasis

Results

Out of the total number of 480 patients eligible for surgery 455 patients agreed to undergo surgery, making acceptance rate of 94.8%. A total of 310 females (68.1%) and 145 males (31.9%) with trichiasis were operated by four TT surgeons in 15 days, an average of 30 patients per day. More than one-third of the patients (179) were below the age of 40 years and smaller proportions (3.1%) of the participants were below the age of 15. In all age groups, females outnumbered males (Figure-1).

Age and sex distribution of operated patients

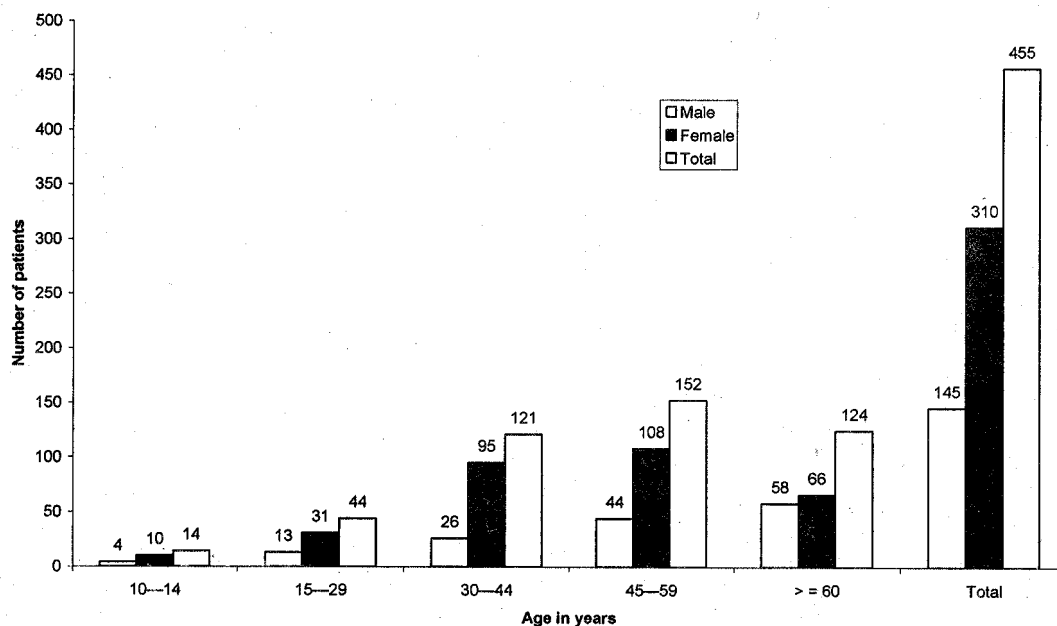


Figure 1: Age and sex distribution of patients operated for trichomatous trichiasis, North Ethiopia, 2005

A total of 695 upper lids with trichiasis underwent surgery and among these 411 (59.1%) were major trichiasis and 284 (40.9%) were minor trichiasis. Bilateral trichiasis was present in 241 (53%) subjects while unilateral trichiasis involving only the right and left eye was seen in 110 (24.2%) and 104 (22.8%) patients, respectively. The baseline characteristics of the patients operated by each surgeon was assessed and no statistical difference was seen in the trichiasis grading for both the

right and left eyes (χ^2 , df (P-value) of 1.21, 3 (0.75) and 4.84, 3 (0.18) for the right and left eyes, respectively).

Out of the total 455 patients that had surgery for trichiasis, 361 (79.3%) persons with a sum of 560 operated lids were available for follow-up examination. Of the 560 operated lids, the follow-up examination at the twelfth post-operative month picked recurrence of trichiasis in 93 (16.6%) upper eyelids. The recurrence rates in the right eye and left eye were similar, 16.4%

(47/287) and 16.8% (46/273), respectively. In terms of persons, 77 (21.3%) of the 361 patients were found to have recurrence in one or both of the operated eyes (14 persons in both eyes, 34 in the right eye and 29 in the left eye). With regard to the post-operative grading of the 93 eyelids with recurrence, 58 (62.4%) were graded as minor while the remaining 35 (37.6%) were graded as major trichiasis. If we compute the recurrence pertaining to major trichiasis, only 6.2% of lids operated had major trichiasis at the first year of follow up.

Although 18.8% (63/335) of patients with pre-operative major trichiasis had recurrence compared to only 13.3% (30/195) of those with pre-operative minor trichiasis, the difference was not statistically significant ($X^2=2.91$, degree of freedom (df) =1, $P=0.09$) (Table 1). Out of the total 171 eyelids among males, 18.7 % (32) had

recurrence, compared to 15.7% (61/389) of the operated lids among females. However, this difference between males and females was not found to be statistically significant ($X^2=0.8$, $df=1$, $P=0.4$). Regarding age, there was no recurrence in patients below age 15 while at least 1 in 5 of those in the age range 44-59 years had recurrence after surgery. Looking at the trend, there appeared an increased likelihood of having trichiasis recurrence with increasing age of the patients (X^2 for trend=5.6, $P=0.02$). The odds of having recurrence among patients age 30-44 years was 54 % less than that of patients age 45-59 years (Table-1). Four TT surgeons conducted the surgeries and recurrence rate by operating surgeon ranged from 10.2 % to 23.8 % and the difference in recurrence among the surgeons was found to be statistically significant ($X^2=12.8$, $df=3$, $P=0.005$) (Table-1).

Table 1: Associations between selected variables and recurrence of trichiasis after surgery, North Ethiopia, 2005

Variables	Post-operative outcome		Odds ratio (95% Confidence interval)	Chi-square and P-values
	Recurrence	No recurrence		
Sex of patient				$X^2 = 0.8$
Male	32 (18.7 %)	139 (81.3 %)	1.24 (0.75, 2.03)	$df = 1$
Female	61 (15.7 %)	328 (84.3 %)	1.00	$P=0.4$
Age of patients				Chi-square for trend = 5.6
10-14	0 (0%)	18 (100%)	0.00 (0.00-0.86)	P=002
15-29	6 (13.3%)	39 (86.7%)	0.55 (0.18-1.43)	
30-44	17 (11.4%)	132 (88.6%)	0.46 (0.24-0.88)	
45-59	42 (21.9%)	150 (78.1%)	1.00	
60+	28 (17.9%)	128 (82.1%)	0.78 (0.44, 1.38)	
Degree of baseline trichiasis				X^2
Minor	30 (13.3%)	165 (86.7%)	1.00	$df = 1$
Major	63 (18.8%)	272 (81.2%)	1.27 (0.77, 2.11)	$P = 0.09$
Surgeon				$X^2 = 12.8$
A	36 (28.8%)	115 (76.2%)	2.75 (1.43, 5.32)	$df = 3$
B	22 (20.4%)	86 (79.6%)	2.25 (1.09, 4.66)	$P = 0.005$
C	18 (10.2%)	158 (89.8%)	1.00	
D	17 (13.6%)	108 (86.4%)	1.38 (0.64, 2.96)	

The persons who were not traced during the one year follow-up period are not expected to be different from the ones who were examined at 12 months. If we suppose that patients who did not come did not have recurrence and, hence, didn't seek any follow up, the overall recurrence rate will be 13.4%. However, if we assume all the patients that were lost to follow-up had recurrence, the overall recurrence rate would rise to 32.8%.

Discussion

Two-thirds of the patients who came for surgery were above the age of 40, which goes with the general consensus that the later complication of trachoma, namely, trichiasis increases after middle age (14). Nevertheless one-third of the patients were below the age of 40 years indicating the relatively early onset of trichiasis in this population. A study in southwestern Ethiopia has also shown more than a quarter of patients presenting with trichiasis to be below the age of 40 years

(15). The finding of trichiasis at an age as low as 10 years is consistent with the report from central parts of Ethiopia, attesting to the enormity of the trachoma problem in the country (14). We have observed the absence of anesthetists in the health centers where the TT surgeons were assigned and young patients who could not tolerate local anesthesia needed to be referred to district hospitals which were very far away and unaffordable to the majority of parents. Therefore, there is a need to strengthen the referral linkage including availability of affordable transportation to centers where the service is provided.

Women accounted for about two-thirds of the cases with trichiasis in accordance with female preponderance described in other studies (16). Nonetheless, the burden of trichiasis was greater than previously estimated, especially among women for whom trichiasis alone was disabling (17).

More than half of the patients presented with bilateral trichiasis, which would have led to bilateral corneal opacity if left untreated. Although high, this finding is much less than the report from the study in central parts of Ethiopia that showed bilateral trichiasis in 82% of the patients (14).

In a matter of 15 days the number of patients that underwent lid surgery was 455 with an average of 30 patients operated per day. The high patient flow in short period of time is an indication of the high burden of the problem and the huge demand for surgical service in the area. This also points to the need for providing good quality surgical service so as to meet the high demand and expectations for the service.

About four out of five operated patients came for follow-up at the twelfth post-operative month, which is a sound result especially considering the distance and communication barriers. Previous studies reported return rate ranging between 70% and 90% (10, 18). Trichiasis recurrence one year after surgery was 16.6% in our study, with the best possible result of 13.4% and the worst possible result of 32.8%. Several prospective studies evaluating the outcome of tarsal rotation procedures at different post-operative months showed different results. Long-term follow up results demonstrated alarmingly high rates up to 60% (19). Randomized controlled trial of Azithromycin treatment after trichiasis surgery showed a recurrence rate as high as 40 % (18). Prospective studies on surgery done by few highly trained surgeons came up with a recurrence rate of 20 % at two years of follow up (9). Follow-up results at one year postoperative evaluation showed recurrence rates of 17.8 % (15, 20).

Though there are several surgical procedures to correct trichiasis the Bilamellar Tarsal Rotation (BTR) is reported to have the lowest recurrence rate and is recommended by the World Health Organization for trachoma control programs (21). However, the Posterior Tarsal Rotation (PTR) procedure, practiced by the trachoma control program of the Carter Center and Amhara Regional Health Bureau, is widely used in Ethiopia and the rest of Africa. According to the findings of different studies and as demonstrated in the current study, the PTR is also shown to have comparable results with the BTR (12, 13).

Seen against the backdrop of other studies conducted on the outcome of trichiasis in trachoma endemic communities, our finding is acceptable and shows the possibility of achieving the "S" component of SAFE (Surgery, Antibiotics, Facial cleanliness, Environment modification) by non-ophthalmologists in trachoma endemic rural communities (10). Randomized clinical trials have also demonstrated that trained paramedical staffs could perform surgery equally well as ophthalmologists (10).

Regarding the factors that contribute towards TT recurrence several factors like the type of surgery, surgeon's skill, severity of trichiasis, previous surgery and active inflammation/infection are considered by different investigators (22-24). We have also found a statistically significant difference in recurrence of trichiasis among patients operated by different surgeons, supporting the surgeon's skill as one of the factors. Although patients were not randomly allocated to each IECW, it was shown that there was no statistically significant difference in pre-operative trichiasis grading of patients among the four IECWs. The inter-surgeon variation indicates the need for continuous and vigilant follow up of TT surgeons by trachoma control programs so as to help minimize recurrence rate, which is the key to maintain the high demand for surgery in trachoma endemic communities.

Major trichiasis is believed to increase the risk of progressive corneal damage and recurrence after surgery. Despite more recurrences in eyelids with major trichiasis, this study did not show statistically significant difference between major and minor trichiasis.

In conclusion, this study has shown that the recurrence of trichiasis following posterior tarsal rotation (PTR) when performed by TT surgeons is acceptable and shows the possibility of achieving the "S" component of SAFE by non-ophthalmologists in trachoma control programs. It has also identified the need to continuously evaluate and give refresher courses for the TT surgeons so that they will improve their surgical skills in order to achieve a low recurrence rate to maintain the high demand for surgery in communities where blinding trachoma is hyper endemic.

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