A trial of surgery for trichiasis of the upper lid from trachoma

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Abstract

Three surgeons operated on upper eye lids of northern Omani villagers for trichiasis due to trachoma using a standardised protocol. The lids were graded as minor trichiasis, five or fewer lashes; major trichiasis, six or more lashes; and lid closure defect. Operative success was defined as no lash/eyeball contact and complete gentle lid closure. One hundred and sixty five lids with major trichiasis were allocated by random number tables to one of five operations: bilamellar tarsal rotation (Ballen), tarsal advance and rotation (modified Trabut), eversion splinting (grey line), tarsal advance (lid split), and tarsal grooving (Streatfield-Snellen) operations. Bilamellar tarsal rotation was significantly more successful than eversion splinting ($\chi^2=7.0$, $p<0.01$); tarsal advance ($\chi^2=12.4$, $p<0.001$), and tarsal grooving ($\chi^2=23.7$, $p<0.001$), but not significantly more successful than tarsal advance and rotation ($\chi^2=2.9$, $p>0.05$). Two of 32 (6%) lids with lid closure defect were successfully treated with tarsal advance; trichiasis was relieved in nine and lid closure defect in 10. It is suggested that bilamellar tarsal rotation and tarsal advance and rotation are effective operations for major trichiasis, but tarsal advance is ineffective where trichiasis and lid closure defect coexist.

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Accepted for publication
30 June 1989

The provision of community based lid surgery to correct trichiasis and lid closure defects is a key strategy for prevention of trachomatous blindness.^{1,2} However, reports of the effectiveness of

standard operations for upper lid trichiasis are few and limited in applicability to individuals from trachoma endemic communities, because most cases have causes other than trachoma^{3,4} or losses to follow-up were large.⁵ In order to identify effective operations for upper lid trichiasis from trachoma in rural northern Oman, where a high prevalence of potentially blinding lid deformities exist,⁶ a trial of standard operations was undertaken for patients brought for surgery by staff of the Oman Prevention of Blindness Programme. The programme comprises six teams of primary eye care workers. They visit villages and towns regularly, where mapping and home visits are performed prior to the preparation of a community census. Team activities include screening for inflammatory trachoma and trichiasis and compiling a list of individuals in need of lid surgery. The patients are examined at a central location, and the census list is used to ensure complete coverage. Surgery is subsequently performed at local hospitals or health centres equipped for eye lid surgery. Patients meeting our criterion of major trichiasis were commonly seen and underwent one of five operations representative of a principal type of upper lid entropion surgery. Lids with defective lid closure were less commonly seen and underwent tarsal advance.

Patients and methods

Adults diagnosed as having trichiasis by primary eye health workers and who wanted treatment were brought for eye lid surgery. Before operation a history of previous upper lid operations was obtained and an ophthalmologist examined the patient with 2.5× loupes with eyes in the primary position, in up-gaze to view the lid margin, and closed gently as in sleep to evaluate lid closure. Upper lids were graded in the primary position as follows:

Minor trichiasis: Lid closure complete; one to five lashes in contact with eye ball.

Major trichiasis: Lid closure complete; six or more eye lashes in contact with eye ball.

Defective closure: Lid closure incomplete; any number of lashes in contact with eye ball.

The extent of trichiasis, from less than half or more than or equal to half the lid width, was also recorded. Informed consent for lid surgery was obtained. Pregnant women were excluded owing to a cultural aversion to surgery in pregnancy. Details of patients were recorded on a proforma. The operations studied were in routine use and the trial was approved by the Ministry of Health of Oman. Upper lids with major trichiasis underwent one of the following operations allocated by random number tables: bilamellar tarsal rotation⁷; tarsal advance and rotation⁸;

Figure 1A: Bilamellar tarsal rotation.

Figure 1B: Tarsal advance and rotation.

eversion splinting⁷; tarsal advance⁸; and tarsal grooving⁹ (Figs 1A-E). Lids with defective closure underwent tarsal advance.⁸

Surgery was performed with standard aseptic technique by one of three surgeons according to a standardised protocol under local anaesthesia with topical 4% and up to 3 ml of 2% lignocaine with 1: 200 000 adrenaline infiltrated into the neuromuscular plane. Sofratulle gauze and 5-0 silk were used for eversion splinting and 4-0 chromic catgut for the other operations. After operation the eyes were dressed with tetracycline 1% ointment instilled into the lower fornix and a pad.

Postoperative examination and dressings with further application of tetracycline 1% eye ointment were performed by ophthalmologists and by ophthalmic trained nurses either at the clinic or at the patient's home for six days. On the sixth day dressings were removed, and tetracycline 1% ointment was given to be applied twice daily to both eyes for six weeks to terminate active ocular chlamydia infection.¹ All patients were examined again by ophthalmic nurses 14 days postoperatively for eye lash/eye ball contact, and silk sutures and gauze rolls were

Figure 1D: Tarsal advance.

removed from lids that had undergone eversion splinting.

The primary measure of outcome was treatment success. This was defined as no eye lash/eye ball contact in the primary position of gaze and complete eye lid closure on asking the patient to close the eyes gently as in sleep.

Follow-up examination of all patients was performed with a 4× halogen illuminated loupe (Keeler) by MR either at clinics or at the patient's home. Information from proformas was entered into dBaseIII plus (Ashton-Tate) for analysis on microcomputer. The proportions of successful outcome at follow-up were compared by allocated operation and by operation done. Those lost to follow-up were included in the denominator. Crossovers of treatment after allocation occurred in five lids as follows. Three lids allocated to tarsal grooving were converted to bilamellar tarsal rotation, as there was insufficient tarsus for grooving: all had undergone previous surgery. One patient allocated tarsal advance became agitated at surgery, and eversion splinting was performed instead. One lid allocated to tarsal advance and rotation underwent tarsal advance in error. Eye lash/eye ball contact was present at 14 days postoperatively in one patient who had undergone eversion splinting, but in no others.

Figure 1C: Eversion splinting.

Results

One hundred and sixty five patients with major trichiasis and 32 with defective lid closure were enrolled consecutively between 1 January and 2 July 1986. A significant association between a history of previous surgery and defective lid closure was noted (Table I). The 165 lids with major trichiasis were allocated to one of five operations. Tarsal grooving had a smaller proportion of lids that had undergone previous surgery. Bilamellar tarsal rotation and tarsal grooving had a higher proportion of lids with trichiasis from half or more of the lid width. These differences were not significant overall (Table II). Losses to follow-up and duration of follow-up were comparable by allocation, but operative success was significantly different (Table III). This was also apparent after correcting for treatment crossovers (Table IV).

Bilamellar tarsal rotation was significantly more successful than eversion splinting

Figure 1E: Tarsal grooving.

TABLE I Lid closure and history of previous surgery in 197 trachomatous upper eyelids with major trichiasis and defective lid closure

	Lid closure defect	
	Yes	No
History of previous surgery:		
Yes	29	39
No	3	126
Total	32	165

Odds ratio=31, 95% CI (9,108)

TABLE II Previous surgery and extent of major upper lid trichiasis by allocated operation

	Bilamellar tarsal rotation	Tarsal advance and rotation	Eversion splinting	Tarsal advance	Tarsal grooving	Total
Enrollment	41	24	24	41	35	165
Past surgery:						
No (%)*	12 (29)	8 (33)	5 (21)	11 (27)	3 (9)	39 (24)
Trichiasis $\geq \frac{1}{2}$ lid width:						
No (%)†	30 (73)	11 (46)	14 (58)	23 (56)	25 (71)	103 (62)

* $\chi^2=6.7$, df 4, $p>0.1$.† $\chi^2=6.9$, df 4, $p>0.1$.

TABLE III Follow-up and outcome of five operations for major upper lid trichiasis from trachoma by operation allocated

	Bilamellar tarsal rotation	Tarsal advance and rotation	Eversion splinting	Tarsal advance	Tarsal grooving	Total
Enrollment	41	24	24	41	35	165
Lost to follow-up:						
No (%)	2 (5)	2 (8)	3 (12)	3 (7)	2 (6)	12 (7)
Mean time of follow-up:						
Months	7.4	8.8	8.7	7.5	7.7	7.9
Range	5–10	8–10	5–11	5–10	5–10	5–11
Success:						
No (%)*	29 (71)	11 (46)	7 (29)	11 (27)	4 (11)	62 (38)

* $\chi^2=32.8$, df 4, $p<0.001$.

TABLE IV Crossovers from allocated operations and outcome by operation done

	Bilamellar tarsal rotation	Tarsal advance and rotation	Eversion splinting	Tarsal advance	Tarsal grooving	Total
Enrollment	41	24	24	41	35	165
Crossovers from:						
to:	0	1	0	1	3	5
Final numbers	44	23	25	41	32	165
Success (%)*	30 (68)	10 (43)	8 (32)	11 (27)	3 (9)	62 (38)

* $\chi^2=31.1$, df 4, $p<0.001$.

($\chi^2=7.035$, $p<0.01$); tarsal advance ($\chi^2=12.38$, $p<0.001$), and tarsal grooving ($\chi^2=23.74$, $p<0.001$), but not significantly more successful than tarsal advance and rotation ($\chi^2=2.87$, $p>0.05$) (Fig 2). Bilamellar tarsal rotation was the most successful operation regardless of previous surgery, extent of trichiasis pre-operatively, and surgeon (Table V).

First operations and lids with trichiasis from less than half the lid margin had higher rates of success, with the exception of eversion splinting and previous surgery (Table V). Failures were least severe for bilamellar tarsal rotation and tarsal advance and rotation, most lids having five or fewer lashes at follow-up, whereas major trichiasis recurred in a large proportion of lids that underwent the remaining three operations (Table VI). Defective lid closure developed only after bilamellar tarsal rotation and tarsal grooving (Table VI).

Of 32 lids with defective lid closure at enrollment 26 (81%) were followed up between four and 10 (mean 7) months after tarsal advance. Two (6%) were successfully treated. Nine (28%) had relief of eye lash/eye ball contact, and 10 (31%) had lid closure restored.

Discussion

The present study is the first to report a randomised trial of eye lid surgery for trachomatous trichiasis. A simple preoperative grading scheme and postoperative criterion of treatment success were used, the grades depending on the number of lashes making contact with the eye ball and gentle lid closure. This is in accord with the current World Health Organisation system for the assessment of trachoma and its complications, in which trichiasis is defined as the presence of any eye lash/eye ball contact regardless of entropion¹⁰ and on recognition of the importance of defective lid closure.¹¹ Our minor trichiasis grade was defined by five or fewer lashes, as we had found this to be the number readily treated with electrolysis. The major grade was subdivided by the extent of trichiasis, if localised to less than half, or involving half or more of the lid margin. This subdivision has been previously described.⁵

The operative groups were comparable for factors likely to influence outcome, previous surgery, extent of trichiasis, and follow-up. Enrollment was unequal, as may be expected with randomised allocation in which a blocking procedure is not used.¹²

The outcome with lids grouped by operation allocated and by operation done was similar, as crossovers from allocated operations were few (Tables III and IV). Bilamellar tarsal rotation and tarsal advance and rotation were the most successful operations. The pattern of successful outcomes for all operations was similar after stratification by factors likely to influence outcome – namely, previous surgery, extent of preoperative trichiasis, and surgeon (Table V). The same pattern was observed when operative failure is considered in which the more successful operations had less severe failures (Table VI). The difference of success rate between surgeons was less marked than Table V would suggest:

Figure 2: Proportion of successful results for five operations for upper lid trichiasis from trachoma.

firstly because failures for bilamellar tarsal rotation and tarsal advance and rotation mainly comprised only one or two lashes at the lateral canthus; and, secondly, because a higher proportion (50%) of lids undergoing bilamellar tarsal rotation by surgeon 2 had undergone previous surgery.

We encountered no serious side effects with any of the operations, but two minor complications were seen with bilamellar tarsal rotation – overcorrection and granuloma formation. One lid was overcorrected, with the

distal fragment being rotated 180° back on to the proximal part of the lid. The wound was reopened and resutured with less tension four days after the initial procedure. Overcorrection after bilamellar tarsal rotation is caused by excessive tension of eversion sutures or a too large marginal fragment.¹³ Two lids developed granulomas at the tarsal incision, which did not recur after excision. Ischaemic necrosis of the marginal fragment has been suggested as a possible complication of bilamellar tarsal rotation but was not observed.¹⁴ The effectiveness of bilamellar tarsal rotation in our series accords with a high (96.7%) success rate reported for a similar tarsal rotation operation.¹⁵

Our 32% success rate for eversion splinting with a gauze roll compares poorly with 98.5% originally reported for this operation and might be due to racial and environmental differences between Burma and Oman or to high losses to follow-up in the original report.⁵ Inquiry revealed that tarsal grooving had been the most widely performed operation for upper lid trichiasis in Oman. The association between previous surgery and defective lid closure (Table I) could not be taken as proof as a casual relationship between tarsal grooving and defective lid closure, which could be explained at least in part by a primary association between past surgery and severe cicatrising disease. However, at postoperative follow-up 16% of eyes developed defective lid closure after tarsal grooving compared with 5% for bilamellar tarsal rotation and none for the remaining three procedures (Table VI), which does suggest that tarsal grooving may result in defective lid closure. This is plausible, as tarsal grooving was the only operation requiring excision of tissue.

A disparity in the effectiveness of upper lid entropion operations advocated for community based lid surgery¹ has been demonstrated. Bilamellar tarsal rotation and tarsal advance and rotation at short term follow-up are reasonably effective, but eversion splinting, tarsal advance, and tarsal grooving were ineffective. Tarsal advance was also ineffective for defective lid closure.

Operations appropriate for community use should be able to be performed effectively and swiftly by non-specialist medical or paramedical staff with minimal resources. Bilamellar tarsal rotation was found to be simpler and quicker than tarsal advance and rotation. Trachomatous cicatrization may be progressive in many patients, so that recurrent trichiasis may be expected with time in an increasing proportion of lids even after effective surgery. Longer follow up of appropriate operations is therefore still required to evaluate the place of community based trichiasis surgery as a strategy for prevention of blindness from trachoma.

We thank the following for their help: His Excellency Dr Ali bin Mohamed bin Moosa, His Excellency Dr Mubarak Al-Khoudouri, Professor S Darougar, Mr Khalfan Nasser, Mr S Brogan, Dr H R Taylor, Dr S West, Mrs B Munoz, and the staff of the National Health Programme, Ministry of Health, Oman.

TABLE V Outcome of five operations for major upper lid trichiasis stratified by previous surgery, extent of trichiasis, and surgeon

	Operation					
	Bilamellar tarsal rotation	Tarsal advance and rotation	Eversion splinting	Tarsal advance	Tarsal grooving	Total
Previous surgery						
Number	32	15	20	30	29	126
Success (%)	23 (72)	7 (47)	6 (30)	9 (30)	3 (10)	48 (38)
Yes	12	8	5	11	3	39
Success (%)	7 (58)	3 (37)	2 (40)	2 (18)	0 (0)	14 (36)
Trichiasis < or ≥ 1/2 lid width						
< 1/2	13	12	11	18	8	62
Success (%)	10 (77)	7 (58)	6 (54)	5 (28)	2 (25)	30 (48)
≥ 1/2	31	11	14	23	24	103
Success (%)	20 (64)	3 (27)	2 (14)	6 (26)	1 (4)	32 (31)
Surgeon						
Surgeon 1						
Number	31	11	16	31	21	110
Success (%)	20 (64)	4 (36)	6 (37)	7 (23)	2 (9)	39 (35)
Surgeon 2						
Number	6	7	6	9	9	37
Success (%)	3 (50)	2 (29)	1 (17)	3 (33)	1 (11)	10 (27)
Surgeon 3						
Number	7	5	3	1	2	18
Success (%)	7 (100)	4 (80)	1 (33)	1 (100)	0 (0)	13 (72)
Overall number						
Number	44	23	25	41	32	165
Success (%)	30 (68)	10 (43)	8 (32)	11 (27)	3 (9)	62 (38)

TABLE VI Recurrent trichiasis and defective lid closure at follow-up after five operations for major upper lid trichiasis from trachoma

	Bilamellar tarsal rotation		Tarsal advance and rotation		Eversion splinting		Tarsal advance		Tarsal grooving	
Trichiasis	n	d	n	d	n	d	n	d	n	d
None	31	1	10	0	8	0	11	0	6	3
1-5	6	1	7	0	6	0	12	0	8	0
>5	1	0	1	0	7	0	10	0	9	2
Further treatment!	4	0	3	0	2	0	5	0	6	0
Lost to follow-up	2	—	2	—	2	—	3	—	3	—
Total	44	2	23	0	25	0	41	0	32	5
Overall total									165	7

n=Number of lids.

d=Of which d lids had defective lid closure.

!=Epilation (17 lids) or surgery (3 lids) prior to follow up.

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