A Survey of Surgical Techniques in Pterygium, Thailand 2016

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BACKGROUND

Pterygium is a common external ocular surface disease characterized by wing-shaped fibrovascular overgrowth of conjunctiva onto the cornea causing significant ocular irritation, inflammation, and corneal astigmatism. The risk factors of pterygium are ultraviolet exposure, geographical latitude, outdoor activity, dry eye, genetic predisposition, increasing age, male sex, races, and low educational level.1,2 Thailand is situated in the pterygium belt, between 37° north and south latitude, which exposes to high ultraviolet intensity and the national occupation is mainly agricultural. Therefore, pterygium is commonly found in Thailand which causes significant ocular disturbance that eventually leads to surgical excision. However, there is a variation in surgical techniques and the recurrence rate. Moreover, there are new surgical techniques that facilitate the ease of surgery and the surgical outcome,3 for example the use of AMT1–4 fibrin glue5–7 and Pterygium Extended Removal Followed by Extended Conjunctival Transplant (P.E.R.F.E.C.T.)10.

This survey is to evaluate the most preferred surgical techniques, how significant the number of new surgical techniques currently used is, the ideal surgical technique, and to find out the obstacles to the ideal surgical technique for both primary and recurrent pterygium among Thai ophthalmologists.

METHODS

This descriptive cross-sectional study was conducted between September 21 and December 21, 2016, using SurveyMonkey, an online questionnaire and data collection platform. The participants were Thai ophthalmologists who were members of the RCOPT.

The sample size of the survey was calculated using the formula \[ n = \frac{p(1-p)Z^2}{E^2} \] with \( p = 23\% \), 95% level of confidence, 5% margin of error resulted in the number of 272 samples. The emailed questionnaires were sent out via RCOPT Express (admin@rcopt.org) to 1150 RCOPT members. The study was approved by King Chulalongkorn Memorial Hospital (KCMH) research committee (IRB Approval number 241/59) and was conducted in strict adherence to the tenets of the Declaration of Helsinki, the Belmont Report, and CIOMS Guidelines. The online survey tool was conducted confidentially and anonymously, therefore the researcher could not identify the specific participant.

RESULTS

512 of 1150 questionnaires were collected (44.5%). 44 questionnaires were incomplete, 30 questionnaires were invalid and excluded. Therefore, 438 completed questionnaires (38.1%) were used for analysis.
Demographic Data
From 438 participants, 262 were females (59.8%), and 176 were males (40.2%). The majority of respondents were in 31- to 35-year age group, accounting for 34.5% of all respondents. General ophthalmologists were the major respondent in this study (61.4%). The corneal specialist accounted for 13.9%. Most of the respondents (46.8%) lived in a central region of Thailand (Table 1).

Surgical Techniques
For primary pterygium, 164 respondents (37.4%) reported that BST was the most preferred technique, followed by CAGT from 149 respondents (34%) and pterygium excision with AMT (26.3%). Most of the respondents (87.4%) did not use the adjuvant therapies in primary pterygium (Table 2).

For recurrence pterygium, 197 respondents (44.9%) preferred CAGT and 184 respondents (42%) preferred pterygium excision with AMT. Adjuvant therapies were used by 40.9% of respondents (Table 2).

Postoperative Topical Steroid
50% of respondents prescribed topical steroid eye drops for 4 to 8 weeks postoperatively.

Complications
No complication was reported in 38.6% of the respondents but 28.8% experienced excessive bleeding (Table 3).
Most of the respondents (65.3%) wished to use mitomycin C as the adjunctive therapy; however, 121 respondents (27.6%) preferred not to use adjunctive therapy.

The ideal techniques which are currently used in clinical practice for primary pterygium and recurrence pterygium were reported by 53.9% and 45.7% of respondents, respectively (Table 4).

The inaccessible and unaffordable amniotic membranes or fibrin glues were most reported as the obstacles to the ideal techniques in both primary and recurrent pterygium surgery (52.4% and 62.3% respectively, average 58%). Concerning about complications (average 26%), lack of experience in surgical procedures (average 25%), large number of patients in the surgery waiting list, prolonged surgical time, and need for conjunctiva preservation in glaucoma patients were also reported (Table 4).

**DISCUSSION**

There are many surgical techniques for pterygium which include BST, simple conjunctival closure, conjunctival flap, conjunctival or amniotic membrane grafting, and adjuvant therapy. Hirst et al. performed a survey in 1991 and 2001 which was 10 years after the first survey. Simple excision with conjunctival flap followed by bare sclera was most used for primary pterygium; simple excision with beta irradiation was most selected for recurrent pterygium. The second survey in 2001 showed that simple excision with conjunctival flap was still the most selected procedure; more alternative techniques such as mitomycin C application and conjunctival autograft were also reported. Recent studies showed that techniques like bare sclera and primary conjunctival closure are considered as inferior and they yielded high rates of recurrence between 50% and 80% whereas pterygium excision with conjunctival or amniotic membrane graft has presented the acceptable recurrence rate between 5% to 20% and 36% respectively. New surgical techniques were also developed to minimize recurrence and complication.

**TABLE 3. Complications**

| Complications                                      | n = 438 (%) |
|---------------------------------------------------|-------------|
| Intraoperative complications                      |             |
| None                                              | 169 (38.6)  |
| Intraoperative excessive bleeding                  | 126 (28.8)  |
| Incomplete pterygium tissue removal                | 56 (12.8)   |
| Conjunctival tear                                  | 40 (9.1)    |
| Misorientation of graft (AMT/CAGT)                 | 32 (7.3)    |
| Damage to medial rectus muscle                     | 13 (3.0)    |
| Perforation of cornea or sclera                    | 2 (0.5)     |
| Early postoperative complications (<3 mo)          |             |
| None                                              | 175 (40.0)  |
| Recurrence                                        | 97 (22.1)   |
| Pyogenic granuloma                                 | 47 (10.7)   |
| Graft loss                                         | 44 (10.0)   |
| Persistent epithelial defect                       | 24 (5.5)    |
| Graft melting                                      | 23 (5.3)    |
| Suture breakage                                    | 23 (5.3)    |
| Other; dry eye, chronic inflammation (2)          | 5 (1.1)     |
| Late postoperative complications (>3 mo)           |             |
| Recurrence                                        | 335 (76.5)  |
| Steroid-induced ocular hypertension                | 42 (9.6)    |
| Corneal/scleral thinning                           | 25 (5.7)    |
| None                                              | 24 (5.5)    |
| Inclusion cyst                                     | 8 (1.8)     |
| Infectious scleritis                               | 2 (0.5)     |
| Other; dry eye (2)                                 | 2 (0.5)     |
| AMT indicates pterygium excision with amniotic membrane transplant; CAGT, pterygium excision with conjunctival autograft transplantation.

**TABLE 4. Ideal Techniques and Obstacles**

| Surgical technique used in primary pterygium        | n = 438 (%) |
|---------------------------------------------------|-------------|
| CAGT                                              | 186 (42.4)  |
| AMT                                               | 171 (39.0)  |
| BST                                               | 40 (9.1)    |
| P.E.R.F.E.C.T.                                     | 35 (8.0)    |
| Simple conjunctiva closure                         | 5 (1.1)     |
| Other; CAGT on AMT (1)                             | 1 (0.2)     |
| Surgical technique used in recurrence pterygium    |             |
| AMT with adjuvant therapy                          | 120 (27.4)  |
| CAGT with adjuvant therapy                         | 116 (26.5)  |
| CAGT                                              | 70 (16.0)   |
| AMT                                               | 60 (13.7)   |
| P.E.R.F.E.C.T.                                     | 44 (10.0)   |
| Simple conjunctiva closure                         | 9 (2.1)     |
| BST with adjunctive therapies                      | 8 (1.8)     |
| Simple conjunctiva closure with adjunctive therapies| 4 (0.9)     |
| BST                                               | 3 (0.7)     |
| Other; conjunctival flap (1), CAGT on AMT (1),     | 4 (0.9)     |
| depending on patient’s affordability of the        |             |
| treatment cost (2)                                 |             |
| Adjunctive therapies                               |             |
| Mitomycin C                                        | 286 (65.3)  |
| None                                               | 121 (27.6)  |
| 5-Fluorouracil                                     | 21 (4.8)    |
| Beta-irradiation                                   | 5 (1.1)     |
| Subconjunctival steroid injection                  | 3 (0.7)     |
| Other; topical Bevacizumab (1), topical anti-VEGF  | 2 (0.5)     |
| (1)                                               |             |
| Do you use ideal surgical technique in primary     |             |
| pterygium?                                        |             |
| Yes                                               | 236 (53.9)  |
| No (If you choose NO, please provide reason) >1    | 202 (46.1)  |
| answer is applicable                               |             |
| Inexperience in surgical procedure                 | 39 (19.4)   |
| Concerning about complication                      | 30 (14.5)   |
| The inaccessible amniotic membranes/fibrin glues   | 106 (52.4)  |
| Other                                              | 27 (29.03)  |
| Need for conjunctiva preservation in glaucoma       | 3 (11.1)    |
| patients                                           |             |
| Large number of patients in the surgery            | 4 (14.8)    |
| waiting list, for surgery, long surgical time      |             |
| High cost of treatment (AMT, fibrin glue)          | 7 (26)      |
| Older patient                                      | 1 (3.7)     |
| Other, no detail is given                          | 12 (44.4)   |
| Do you use ideal surgical technique in recurrent pterygium? Yes | 200 (45.7)  |
| No (If you choose NO, please provide reason) >1 answer is applicable | 238 (54.3)  |
| Inexperience in surgical procedure                 | 68 (28.3)   |
| Concerning about complication                      | 83 (34.6)   |
| The inaccessible amniotic membranes/fibrin glues   | 149 (62.3)  |
| Other                                              | 43 (18.2)   |
| Referral to cornea specialist                      | 4 (9.3)     |
| Large number of patients in the surgery            | 2 (4.7)     |
| waiting list, for surgery, long surgical time     |             |
| Depending on no. and severity of recurrence       | 2 (4.7)     |
| Other, no detail is given                          | 35 (81.4)   |

AMT indicates pterygium excision with amniotic membrane transplant; CAGT, pterygium excision with conjunctival autograft transplantation. VEGF, vascular endothelial growth factor.
Conclusions

BST and CAGT were the most preferred surgical techniques for primary and recurrent pterygium, respectively. Techniques such as P.E.R.F.E.C.T. and AMT were still less applied. The ideal
technique for primary pterygium was CAGT and that for recurrent pterygium was pterygium excision with graft (either conjunctiva or amniotic membrane graft) with adjuvant therapy. Around half of the surveyed ophthalmologists faced obstacles to the performance of an ideal surgical procedure for patients. The most frequently reported obstacle was the inaccessible amniotic membranes/fibrin glues. The recurrence of pterygium was still the major postoperative complication. To emphasize, both quality and quantity measures in pterygium surgery techniques and supplies are yet to be improved.

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REFERENCES

1. Ang M, Li X, Wong W, et al. Prevalence of and racial differences in pterygium: a multiethnic population study in Asians. Ophthalmology. 2012;119:1509–1515.
2. Chen T, Ding L, Shan G, Ke L, Ma J, Zhong Y. Prevalence and racial differences in pterygium: a cross-sectional study in Han and Uygur adults in Xinjiang, China. Invest Ophthalmol Vis Sci. 2015;56:1109–1117.
3. Janson BJ, Sikder S. Surgical management of pterygium. Ocul Surf. 2014;12:112–119.
4. Ozar A, Yildirim N, Erol N, Yurdakul S. Long-term results of bare sclera, limbal-conjunctival autograft and amniotic membrane graft techniques in primary pterygium excisions. Ophthalmologica. 2009;223:269–273.
5. Liang W, Li R, Deng X. Comparison of the efficacy of pterygium resection combined with conjunctival autograft versus pterygium resection combined with amniotic membrane transplantation. Eye Sci. 2012;27:102–105.
6. Solomon A, Pires RT, Tseng SC. Amniotic membrane transplantation after extensive removal of primary and recurrent pterygia. Ophthalmology. 2001;108:449–460.
7. Karalezli A, Kucukerdonmez C, Akova YA, Altan-Yaycioglu R, Borazan M. Fibrin glue versus sutures for conjunctival autografting in pterygium surgery: a prospective comparative study. Br J Ophthalmol. 2008;92:1206–1210.
8. Ratnalingam V, Eu AL, Ng GL, Taharin R, John E. Fibrin adhesive is better than sutures in pterygium surgery. Cornea. 2010;29:485–489.
9. Mahdy RA, Wajieh MM. Safety and efficacy of fibrin glue versus vicryl sutures in recurrent pterygium with amniotic membrane grafting. Ophthalmic Res. 2012;47:23–26.
10. Hirst LW. Prospective study of primary pterygium surgery using pterygium extended removal followed by extended conjunctival transplantation. Ophthalmology. 2008;115:1663–1672.
11. Sebban A, Hirst LW. Treatment of pterygia in Queensland. Aust N Z J Ophthalmol. 1991;19:123–127.
12. Troutbeck R, Hirst L. Review of treatment of pterygium in Queensland: 10 years after a primary survey. Clin Exp Ophthalmol. 2001;29:286–290.
13. Mohammed I. Treatment of pterygium. Ann Afr Med. 2011;10:197–203.
14. Chaidaroon W, Thongkha-Om M, Wiwatwongwana D, Wiwatwongwana A. A survey of pterygium surgery in Thailand 2010. J Med Assoc Thai. 2013;96:64–68.
15. Kampitak K, Bhornmata A. The results of pterygium excision at Thammasat Hospital. J Med Assoc Thai. 2015;98:495–500.
16. Hirst LW. Recurrence and complications after 1,000 surgeries using pterygium extended removal followed by extended conjunctival transplant. Ophthalmology. 2012;119:2205–2210.