EFFECTIVENESS OF PTechSIA QUESTIONNAIRE IN QUANTIFYING PHACOEMULSIFICATION SURGICAL TECHNIQUE VARIATIONS: A PILOT STUDY

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ABSTRACT

Introduction: Detailed-documentation of phacoemulsification surgical techniques in operative note is not a routine in clinical practice. However, this information is crucial in order to quantify the variations in surgeon's surgical technique and to further evaluate the surgeon's surgically induced astigmatism (SIA) predictability. **Aim:** To assess the effectiveness of Phacoemulsification Technique Related to Surgically Induced Astigmatism (PTechSIA) questionnaire in quantifying the phacoemulsification surgical technique variations. **Methods:** Four ophthalmic surgeons (Surgeons A, B, C and D**)** at IIUM Eye Specialist Clinic were involved in this study**.** A validated self-administered questionnaire with 9 items (PTechSIA, patency number: LY2018002935) was employed to assess the surgeons' surgical techniques during phacoemulsification. All the responds were scored for each item using Variation Score (VS). Score '0' was given, when a surgeon ticked only one option of the surgical techniques, Score '1' when a surgeon ticked two options, and so on for each item. VSs of all 9 items were summed up to obtain Total Variation Score (TVS). A higher TVS indicated a higher variation in surgical techniques. **Results:** PTechSIA showed that all surgeons had different TVS. Surgeons A and B had TVS of 1, whereas Surgeons C and D had TVS of 0 and 3, respectively. TVS of each surgeon indicated that all surgeons had variations in phacoemulsification surgical techniques. **Conclusions:** PTechSIA is an effective tool to evaluate and quantify the variation of surgeons' surgical techniques in phacoemulsification. Hence, PTechSIA is suggested to be used extensively for a larger scale of surgeons in future research related to phacoemulsification surgical technique and SIA.

Keywords: PTechSIA, surgical technique variation, variation score, surgically induced astigmatism, SIA

INTRODUCTION

Surgically induced astigmatism (SIA) is caused by incisions in phacoemulsification surgery. It is an important value to be used as a reference in predicting postoperative astigmatism and would be helpful in the selection of toric intraocular lens (IOL) (Clark, 2018; Gundersen & Potvin, 2016; Hill, 2008)

There are several factors affecting the magnitude of SIA as documented in previous works such as the corneal biomechanical properties, incision size, incision location and preoperative astigmatism (Chang, Su, & Chen, 2015; Denoyer et al., 2013; Hashemi et al., 2016; Yoon, Kim, Lee, & Nam, 2014). However, variation in surgeons' surgical techniques that could be affected the consistency and predictability of surgeon's SIA remains under-explored.

Surgeons' surgical techniques are commonly not completely documented in operative note. This information is vital in order to further evaluate the consistency and predictability of surgeon's SIA. Due to unavailability of the information, a validated tool named as Phacoemulsification Technique Related to Surgically Induced Astigmatism questionnaire (PTechSIA, patency number: LY2018002935) has been developed (Md Muziman Syah et al., 2019). Hence, the purpose of this current study was to assess the effectiveness of PTechSIA questionnaire in quantifying the phacoemulsification surgical technique variations.

MATERIALS AND METHODS

This pilot study recruited four ophthalmic surgeons at IIUM Eye Specialist Clinic (Surgeons A, B, C and D) through convenient sampling. This research obtained ethical approval from the Ethics Committee, International Islamic University Malaysia (Reference number: IREC 2018-65).

Questionnaire administration and scoring

Self-administered PTechSIA questionnaire was distributed to all surgeons to assess and quantify their phacoemulsification surgical techniques. All surgeons were briefly explained the purpose and risks of

participating in this study. All questions raised by the surgeons were addressed accordingly by the researcher (N.M.). Written informed consent was obtained from all surgeons. The completed questionnaires were returned to the researcher within a week.

PTechSIA questionnaire consisted of 9 items. Each item was scored using Variation Score (VS). The item was scored with '0' if a surgeon ticked one option of the surgical techniques mentioned in the particular item (no variation in technique), scored with '1' if a surgeon ticked two options, scored with '2' if a surgeon ticked three options and so on. All the VSs were summed up to obtain Total Variation Score (TVS). A higher TVS indicated a higher variation in surgical techniques. Example of the scoring is shown in Figure 1.

PHACOEMULSIFICATION TECHNIQUES RELATED TO SURGICALLY INDUCED ASTIGMATISM QUESTIONNAIRE (PTechSIA)

Kindly please tick/ state your respond accordingly.
You may tick MORE than one options for each question.

NO	QUESTIONS	OPTIONS	*VS
1	Which is/are your preference hand(s) during performing phacoemulsification surgery?	☑ Right ☐ Left ☐ Both hands	0
2	What is/are your incision(s) architecture?	☑ Single plane ☐ Biplanar ☐ Triplanar Others (Please state):_____	0
3	What is/are the type(s) of incision that you use normally?	☑ Clear corneal ☐ Scleral ☐ Near clear corneal (___mm from limbus) Others (Please state):_____	0
4	What is/are the surgical method(s) that you apply?	☑ Phaco-chop ☑ Stop-chop ☐ Divide and Conquer Others (Please state):_____	1
5	What is/ the size(s) of your main incision?	☐ 2.0 mm ☐ 2.2 mm ☑ 2.75 mm ☐ 3.0 mm Others (Please state):_____	0
6	Where do you place your main incision(s)?	☐ 90° ☐ 180° ☑ Superotemporal ☑ Superonasal Others (Please state): ***On steep axis***	2
7	Do you use any particular microkeratome design(s) for your main incision?	☑ Single-Bevel ☐ Double-Bevel ☐ Bevel-Up Others, please state: _____	0
8	How many sideport(s) do you make?	☑ One ☐ Two ☐ Three Others (Please state):_____	0
9	Where do you place your sideport incision(s) in relative to the main incision?	☐ < 90° away ☑ 90°-110°away ☐ >110°away Others (Please state):_____	0
		***TVS**	**3**

* ***For researcher use only. Leave it blank.***

Figure 1. Example of the PTechSIA questionnaire scoring

RESULTS

Table 1 displays the details of surgeons' phacoemulsification surgical technique variation scores. TVSs revealed that there were variations in surgical techniques performed by each surgeon. Surgeon D had the highest TVS which indicated having the most variation in his/her surgical techniques (varied in incision architecture, phacoemulsification technique and main incision location). Both of Surgeons A and B had a similar TVS of 1, where their variation was only in main incision location. Only Surgeon C had TVS of 0 that indicated no variation in his/her surgical techniques.

Table 1. Variation scores of surgeon's phacoemulsification surgical techniques

Item No.	Items	Variation Score (VS)			
		Surgeon A	**Surgeon B**	**Surgeon C**	**Surgeon D**
1	Hand dominance	0	0	0	0
2	Incision architecture	0	0	0	1
3	Incision type	0	0	0	0
4	Surgical method	0	0	0	1
5	Incision size	0	0	0	0
6	Incision location	1	1	0	1
7	Microkeratome design	0	0	0	0
8	Number of sideports	0	0	0	0
9	Sideport location	0	0	0	0
Total Variation Score (TVS)		**1**	**1**	**0**	**3**

DISCUSSION

Documentation of surgical techniques details in operative note has rarely been practised even the information would be useful to quantify the variations in surgeon's surgical techniques and to further assess the factors that affecting postoperative outcomes. Thus, PTechSIA questionnaire was developed to fulfil the need of a comprehensive documentation on surgical techniques related to SIA. PTechSIA questionnaire has gone through a proper face and content validity processes as reported in our previous work (Md Muziman Syah et al., 2019). However, the effectiveness of this tool in quantifying the phacoemulsification surgical technique variations has not been established yet. Hence, this study had been conducted in order to assess its effectiveness.

Based on TVS results, it was observed that all surgeons had different variations in phacoemulsification surgical techniques. All surgeons had their surgical preference techniques in phacoemulsification. PTechSIA was able to quantify the variation in each surgical technique item through VS and total variation of all phacoemulsification surgical techniques using TVS. Unlike previous studies on surgical technique variations which provided qualitative descriptive outcome (Fairclough et al., 2017; O'Sullivan, Matthews, & O'Reilly, 2016). By establishing the TVS, further study can be carried out to explore the relationship with other variables that related to surgeon's surgical technique variations such as the association of SIA consistency and surgical technique. Several previous works suggested that a consistent surgical technique can improve the predictability of postoperative outcome (Chang et al., 2015; Nagy, 2014; Arthur et al., 2016). However, to date, there is no study has been conducted to prove the suggestion. It could be due to unavailability of a standard method or specific tool to document a surgeon's surgical techniques and subsequently to quantify its variations. To the best of our knowledge, this study is the first work to quantify surgeon's surgical technique variations using a validated tool.

From statistical point of view, quantitative data (VS and TVS) help researchers to validate their hypothesis using statistical analysis (Blanca, Alarcón, & Bono, 2018; Charlesworth & Foëx, 2016). This approach is more purposive and able to evaluate any association between two variables (Charlesworth & Foëx, 2016). For any newly-developed tool, the effectiveness and feasibility in fulfilling its purpose require a pretesting process, thus allows for technical refinement to increase reliability (Husni et al., 2007; Saturno- Hernández et al., 2018). Based on our findings, all items in

PTechSIA using the variation scores (VS and TVS) were sufficiently quantified the variations in phacoemulsification surgical techniques. This indicated that PTechSIA is adequate to fit the purpose of quantifying surgical technique variations.

CONCLUSIONS

PTechSIA questionnaire can serve as an effective tool to evaluate and quantify the variation of phacoemulsification surgical techniques. Utilization of PTechSIA can be expanded in future multicenter research related to surgical technique variation and SIA.

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