

Siep's test: A novel test for checking wound integrity in small-incision cataract surgery

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Purpose: This study was conducted to ensure the integrity of surgery wounds. **Methods:** This was a randomized prospective trial of 300 patients who underwent small-incision cataract surgery (SICS) at our hospital over a one-year period. We used 2–3 drops of 5% povidone-iodine at the end of each case, not only to disclose any wound leaks but also to sterilize the surface of the eye. **Results:** Three hundred patients underwent SICS. One hundred ten patients had postoperative wound leak in SICS due to surgical complications. Premature entry comprising 75% (83 cases), followed by floppy iris syndrome comprising 20% (22 cases) and 5% (6 cases) comprising pseudoexfoliation (PXF) syndrome. There was a drop in the number of re-surgeries from 12 to 3 cases since we started implementing this technique. **Conclusion:** The simple procedure is very handy and economical in identifying the leak and can reduce further complications such as endophthalmitis and re-surgeries. Among residents, this can be a boon where povidone-iodine acts as a riverbank for the outflow of aqueous, outlining the speed, location, and quantity of the leak. Siep's test plays an important role in identifying any postoperative wound leaks and also sterilizing the eye surface post surgery.

Key words: Povidone-iodine, resident surgery, Siep's test, small-incision cataract surgery, wound leak

Access this article online

Website:

www.ijo.in

DOI:

10.4103/ijo.IJO_1585_22

Quick Response Code:



Siep's test is named after the surgeon Steven B. Siepser. Siep's test can assure a surgeon that he has a watertight wound along with sterilizing the ocular surface at the end of a surgical case. Standard of care for performing routine cataract surgery has become sutureless clear corneal incisions following advantages; these include the decreased incidence of corneal astigmatism from a suture, reduced cost of surgery without suture, and the relative ease of creating a presumed watertight corneal incision.^[1] However, there is concern that leaving incisions in small-incision cataract surgery (SICS) without definitive closure may increase the risk of wound leaks. The procedure is simple and straightforward. It is easily performed, and the findings are accurate. We used this procedure among residents training in intraocular surgeries to detect wound leak after performing the surgery.

Methods

An observational cross-sectional study was undertaken at the department of ophthalmology, in our tertiary eye hospital for a duration span of 12 months (2018–2019). Based on our hospital medical records, the number of cataract surgeries (SICS) per month for patients aged >70 years, operated by ophthalmic

residents is on an average 25. Thus, for a period of one year our sample size (N) was 300.

The percentage frequency of the outcome factor in the population was around (p) 31% \pm 5. Confidence limits as percentage of 100 (absolute \pm %) (d) was 5%.^[2]

Design effect (for cluster surveys-DEFF): At confidence interval of 95%, the sample size was 158.

Equation: Sample size $n = [DEFF * Np(1 - p)] / [d^2 / Z^2 1 - \alpha * (N - 1) + p(1 - p)]$

Three hundred patients who were undergoing SICS performed by ophthalmology residents were included. All patients irrespective of age, sex, history of hypertension/diabetes type 1 or 2/blood transfusion/tuberculosis/asthma were included. The study received ethical approval from the institutional and ethical review board of our tertiary hospital, following which the study was carried out. The study was carried out with strict adherence to the guidelines of the Declaration of Helsinki. Procedure: A complete ophthalmic examination that included visual acuity, extraocular movements, slit-lamp biomicroscopy, and fundus examination was done. Axial length and keratometry values were estimated and IOL power was calculated using SRK/T formula. All patients having nuclear sclerosis grades 1–4 along with mature

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Received: 01-Jul-2022

Revision: 02-Sep-2022

Accepted: 16-Sep-2022

Published: 25-Oct-2022

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Cite this article as: Gadavi BN, Pai A, Kamath MA, Bhosale DA, Gohel DJ. Siep's test: A novel test for checking wound integrity in small-incision cataract surgery. Indian J Ophthalmol 2022;70:3974-6.

cataract were included in the study. Any history of ocular trauma, cases having subluxated or dislocated lens, congenital or developmental cataract, and patients with only eye to be operated were excluded from the study. Patients were given peribulbar block for all cases. All cases were SICS performed by first-, second-, and third-year postgraduate students under the supervision of the consultant in charge. Cases with a pupil size of <4 mm or with pseudoexfoliation (PXF) syndrome were dilated intraoperatively with iris hooks by making four ports for insertion of iris hooks. At the end of the case, the globe was inflated to a normal pressure. The globe was confirmed to be firm by using the finger tension ballottment at the end of the surgery. A drop of paracaine was added just before instilling povidone-iodine. Two to three drops of povidone-iodine 5% was instilled over the wounds. The leaking aqueous was outlined by the povidone-iodine disclosing the clear flow from the eye, suggesting an aqueous leak.^[3] If any leak was seen, it was immediately and meticulously sutured. All traces of the povidone-iodine were then washed out to prevent any secondary inflammation, corneal changes, or any discomfort to the eye.

Statistics: The data obtained were collected, analyzed, assessed, and tabulated and were entered into an Excel spreadsheet and then transferred to the Statistical Package for the Social Sciences (SPSS) software version 22 (SPSS Inc, Chicago, IL, USA) for analysis.

Results

Of the 300 patients, 180 were females and remaining 120 were males [Fig. 1]. Two hundred twenty-five patients were above

70 years of age followed by 55 patients who were in the age group of 60–69 years, and the remaining 20 patients were in the age group of 50–59 years [Table 1]. One hundred ten had positive Siep's test while the remaining 190 had negative Siep's test [Fig. 2]. Premature entry comprised 75% (83) of cases, followed by floppy iris syndrome comprising 20% (22 cases) and PXF syndrome comprising 5% (6 cases) [Table 1] [Fig. 3]. Out of the cases that had positive Siep's test, eight five were performed by first-year residents, 12 by second-year ophthalmology residents, and the remaining 13 were performed by third-year ophthalmology residents [Fig. 4]. All these 110 cases underwent immediate suturing for wound leak intraoperatively. From when we started utilizing Siep's test, the number of re-surgeries drastically dropped from 12 cases in 2018 to 3 cases in 2019 [Table 2].

Discussion

The literature is adequate with examples of complications and endophthalmitis as a result of wound leaks, with one study showing that the incidence of contamination was 44 times more frequent.^[4] If there is a leaky clear corneal incision then mostly after a blink, the wound sucks in fluid from the eye surface leading to ocular contamination. One study found that in 100 cases, almost one-third of the incisions leaked.^[2] Another case report demonstrated fluid egress in a seemingly watertight 1.4-mm clear corneal incision (CCI).^[5] There is also a documented case of iris prolapse through the CCI two weeks after six cataract surgeries due to postoperative vomiting.^[6] Hence, sealing leaking ocular incisions is critical to decreasing the incidence of endophthalmitis. To our knowledge, there is

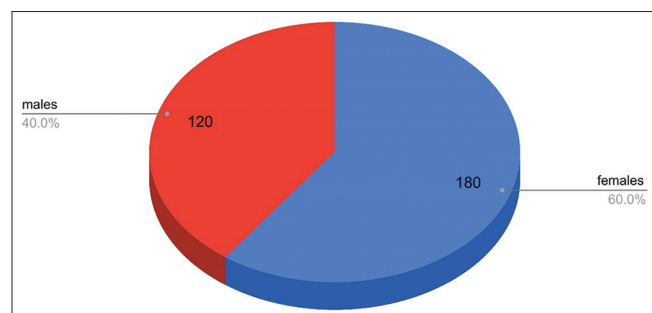


Figure 1: Gender prevalence in the study

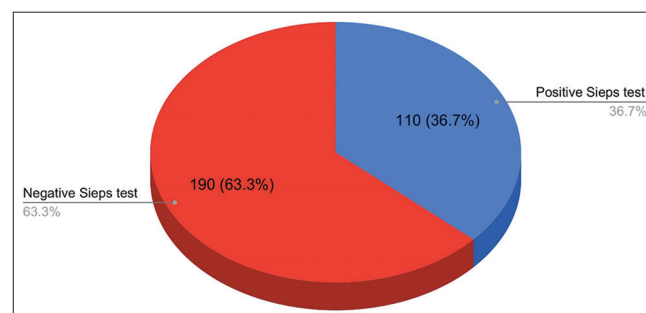


Figure 2: Number of cases that were Siep's test positive and negative

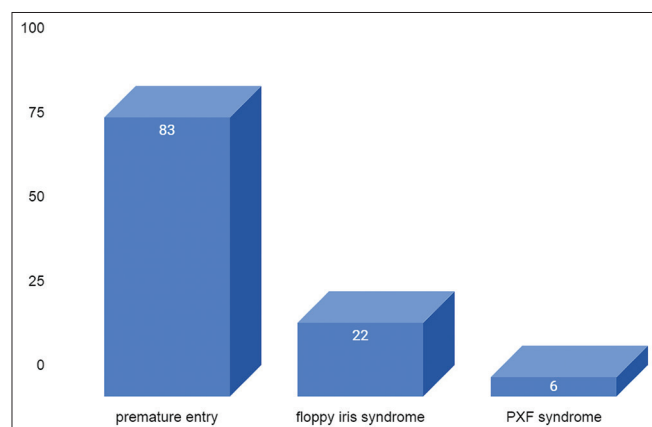


Figure 3: Complication leading to Siep's test positivity

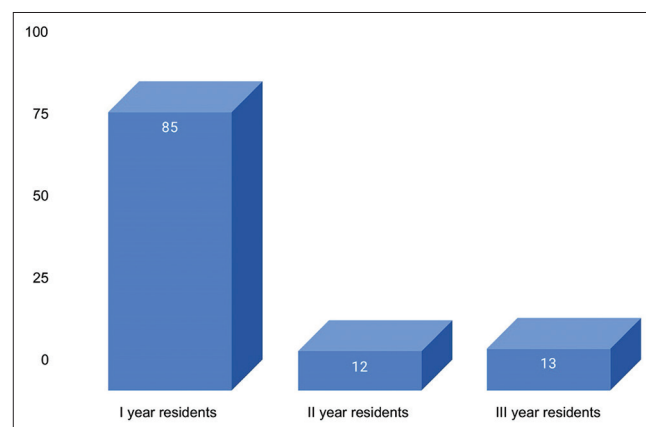


Figure 4: Siep's test positivity among ophthalmology residents

Table 1: Percentage of intraoperative cause leading to positive Siep's test

Cause	Percentage
Premature entry	75
Floppy iris syndrome	20
PXF syndrome	5

Table 2: Number of re-surgeries performed per year

Year	Number of re-surgeries
2018	12
2019	3

no study which helps identify leaks in procedures that have scleral incision like SICS, especially among postgraduate ophthalmology residents who are learning cataract surgeries. This test comes in handy to detect any leaks intraoperatively and take immediate care of the same.

Conclusion

Cataract surgery is the most commonly performed surgery in the world, giving sight to millions. The need for providing maximum asepsis has led to the development of guidelines and stringent aseptic precautions. Identifying the leak is of prime importance which can reduce further complications. Thus, Siep's test plays an important role here in identifying any postoperative wound leaks. The simple procedure is very handy in peripheral areas where getting total asepsis is difficult; especially among residents this can be a boon where povidone-iodine acts as a riverbank for the outflow of aqueous, outlining the speed, location, and quantity of the leak. The additional benefit is that povidone-iodine applied at the end of a surgical procedure sterilizes the surface of the

eye. Special care must be taken in patients who underwent complications leading to a prolonged procedure as wound leakage is imminent and due care like suturing meticulously is mandatory. This simple test allows for a quick check on wound integrity and tight closure of the wound. A surgeon can now know that chances of low eye pressure, lens rotation, lens dislocation, or endophthalmitis are minimal as there is good wound closure. Furthermore, it can be used in monocular patients, patients with diabetes or immunocompromised individuals who are at increased risk of infection.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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