

Patients' perception of the open-space operating hall for cataract surgery

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Abstract

Background : The purpose of this study was to assess the perception of patients undergoing cataract surgery under topical anesthesia in an open-space operating hall. The study was set in the Department of Ophthalmology, Cochin Paris Descartes University Hospital, in a newly built open-space operating hall dedicated to ophthalmic surgery. **Methods:** 250 consecutive patients undergoing cataract surgery by 11 surgeons were included in this prospective study. All the included patients have been operated in an open-space operating hall with 3 surgical areas. Only first-eye standard cataract surgeries performed under topical anesthesia were included. Responses to a face-to-face questionnaire administered by a single interviewer to patients before their discharge on the day of their surgery were analyzed. **Results:** Fifty-two patients (21%) knew beforehand that their procedure would take place in an open-space operating hall, 118 (47%) realized that they were in such an environment on the occasion of their surgery and 80 (32%) did not notice. Conversations and noises unrelated to their own surgeries were overheard respectively by 15 (6%) and 37 (15%) patients. Of the 250 patients, 237 (95%) did not report any discomfort associated with the fact that their procedure had been performed in an open-space operating hall. **Conclusions:** Cataract surgery performed in an open-space setting did not seem to affect the patients' comfort during the procedure. **Trial registration :** This manuscript has been retrospectively registered and approved in 9 october 2018 by the Ethics Committee of the French Society of Ophthalmology (IRB 00008855 Société Française d'Ophthalmologie IRB#1) because the Committee did not find any challenge against the medical and scientific rules of ethics, as accepted in France.

Background:

Over the last decades, progress in cataract surgery has been linked to improvements in the technology of phacoemulsification, intraocular lenses and microscopes. The reliability of modern cataract surgery has been one of the factors leading to the worldwide increase in the number of procedures performed each year.¹ The shortening of the duration of the procedures has been another benefit stemming from the improvement of cataract surgery.² Nowadays, the preoperative steps for the preparation of the patient and of the material required for the surgery routinely take a longer time than the surgical procedure in itself. Indeed, these steps can limit the number of procedures performed each day by experienced surgeons. Hence, beyond technical improvements and independently of the skills of surgeons, any other factor that can increase the flow of patients in operating rooms is critical. Because the cost of building or renovating operating rooms to modern specifications is significant, infrastructure modifications do not always follow the pace of other changes for the care of patients. An open-space operating room comprises multiple surgical areas within a single hall. Such a design has been suggested for the purpose of improving patient flow, sharing inventories between operating areas and globally streamlining the surgical process. Open-space rooms need to be designed to the same standards of safety as conventional operating rooms, in particular for the prevention of nosocomial infections. This can be achieved by modern laminar airflow systems on each area, with a pressure regulation ensuring that air cannot flow from one area to another.³ To our knowledge, only a handful of facilities with open-space operating halls are run in Europe

and those are used for orthopedic or multi-specialty surgery. Our institution was the first to build an open-space operating hall dedicated to ophthalmic surgery. Our objective was to simplify the patient flow, with the possibility of preparing a patient in one area while surgery was ongoing in another. While the experience gained in other institutions was reassuring regarding the safety of open-space operating halls for the prevention of infections, the implementation of this design for ophthalmic procedures raised concerns regarding patient comfort during surgery.⁴ Indeed, as almost all cataract surgery is performed under topical anesthesia, the patients' stress and/or discomfort are key factors that can lead to adverse events.^{5,6} Indeed, in open-space offices, the perception of noise is identified a significant source of discomfort for workers.⁷ In a similar manner, we were concerned that the perception of noise not directly related to their own procedure could be stressful for patients operated in an open-space setting. Shortly after the opening of our open-space operating hall, we sought to assess the patients' perception of their cataract surgery in such a setting.

Methods:

This was a prospective, single-center study of 250 consecutive patients who underwent cataract surgery in the operating hall of the Ophthalmology Center of the Cochin University Hospital, Paris. Only first-eye surgeries performed under topical anesthesia were included, 11 surgeons participated in the study. It was possible to configure the 3 areas of the surgical hall in several manners. If a single surgeon used multiple areas, the patients were prepared for surgery on either one or two areas, while the surgeon operated on another. Otherwise, two or three surgeons operated concomitantly in the open-space operating hall (Figure).

The patients answered a questionnaire in face-to-face interviews with a single observer. The data was collected post-operatively, before patients were discharged. The questionnaire included 9 questions and aimed to assess what the patients heard during their surgery, whether they were aware of being operated on in an operating hall and if it led to any discomfort during the procedure. The patients were asked if they had heard conversations other than their direct dialogue with the surgeon or his aides. Their replies were further refined to assess whether any overheard conversation was perceived as an inconvenience. Additionally, the patients were asked if they had heard noises unrelated to their own procedure and whether those noises were perceived as an inconvenience. The patients were asked if they knew beforehand that they would be operated in an open-space setting and whether this was reassuring, worrisome or indifferent. The patients were asked whether they had noticed that other surgeries or preparations for procedures were ongoing concomitantly in the open-space surgical hall and if the presence of other patients was perceived as an inconvenience. Finally, the patients were asked whether they had perceived any discomfort due to the fact that their procedure had been performed in an open-space operating hall.

A verbal informed consent was obtained from all participants, the study was approved by the Ethics Committee of the French Society of Ophthalmology and adhered to the Declaration of Helsinki for research involving human subjects.

Results:

The patients were recruited between October 10 and November 30, 2017, i.e. 2 to 4 months after the opening of the open-space operating hall. The mean age of the patients was 71 ± 10.2 years and their sex ratio was 0.57 (91 men, 159 women). The results of the questionnaire are shown in the Table.

Conversations unrelated to their own procedure were overheard by 15 (6%) patients and all of these patients declared that these conversations were neither inconvenient, nor disturbing. Noise unrelated to their interventions was heard by 37 (15%) patients, of whom 29 (12%) felt no discomfort and 8 (3.4%) felt some discomfort. Among our patients, 52 (21%) knew prior to their procedures that they would be operated in an open-space operating hall, none found this to be worrisome, 15 (6%) patients found it reassuring and 35 (14%) declared to be indifferent to it. The largest subgroup comprised 170 (68%) patients who became aware of being operated in an operating hall during their procedure. Eighty (32%) patients did not know beforehand nor realized during their surgery that their procedure had been performed in an open-space operating hall. Among patients who realized that their surgery took place in a surgical hall, 159 (64%) detected this before the beginning of their procedure, 10 (4%) during the procedure, and 2 (1%) once the procedure was completed before leaving the hall. Overall, 237 (95%) patients reported no discomfort related to the open-space operating hall setting, 10 (4%) patients reported a mild discomfort. Only one patient reported a major discomfort, while two patients had no opinion on the matter.

Discussion

The purpose of an open-space surgical hall is to facilitate the flow of surgical procedures and their required logistics. Yet, to our knowledge, only a handful of open-space surgical halls are operated in Europe and until the opening of our new facility none was dedicated to ophthalmic surgery. Cataract surgery has become a short procedure, for which the time needed to prepare the patient and the materials required for surgery generally takes longer than the surgical act. Hence, to increase their patient flow, surgeons performing high volume cataract surgery often go back and forth between two areas: a patient is prepared in one area, while surgery is performed on the other. Open-space operating rooms allow an optimized synchronization between the areas. Other benefits include a single inventory for multiple areas and the sharing of expertise between operating room personnel. Laminar air fluxes with positive pressuring system above each operating area have demonstrated their efficacy to maintain a sterile environment in operating areas.⁸ These systems prevent the flow of air from one area to another within the open-space hall. Although we could not find statistics in the medical literature, existing open-space operating halls used for orthopedic surgery have not been associated, to our knowledge, with an increase risk of infection. We were therefore confident that an open-space operating hall could be built for cataract

surgery without increasing the risk of endophthalmitis. As a new building was being designed for our department of ophthalmology, our purpose in requesting an open-space operating hall was to optimize our patient flow for cataract surgery. Yet, as almost all cataract surgeries are performed under topical anesthesia, one of our concerns was that the patients might negatively react to the fact that they would be operated in an open-space setting. In the medical literature, the data regarding the perception of patients during their cataract surgery have been focused on the assessment of pain and/or on the patients' visual perceptions.^{9,10,11} Our analyses are focused on specific perceptions that could have been linked to the new open-space setting where the procedures were performed. Overall our results were overwhelmingly reassuring, with 95% of our patients reporting no discomfort linked to their surgery being performed in an open-space setting. Rates of complications in cataract surgery have been shown to decrease with the number of procedures performed by each surgeon.¹² Hence, patients' anxiety can be decreased by the knowledge that their surgeon is performing a high number of similar procedures. Yet, conversely, some patients may be stressed by the perception that their surgery is performed in a high-volume, almost factory-like environment. Our results suggest that such a phenomenon was not observed in relation with our open-space surgical setting. By essence, this study has no control group that would have been operated by the same team during the same period in a conventional operating room. Therefore, meaningful comparisons to the level of comfort for cataract surgery performed in different environments cannot be made. Our study was focused on patients' perception but did not assess the surgeons' perceptions of surrounding noise or conversations in the open-space operating hall. The effect of distraction on simulated anterior segment surgical performance has been shown to increase the rate of complications.¹³ Whether open-space operating hall can influence surgical performance will require other studies.

Conclusions :

The number of cataracts operated worldwide is continuously increasing, which ought to stimulate innovative ways to organize the procedure, without compromising safety. The results of our study suggest that open-space operative halls are adapted to shortened procedures under topical anesthesia and do not jeopardize patients' comfort.

Abbreviations

Not applicable

Declarations

- Ethics approval : This manuscript has been approved by the Ethics Committee of the French Society of Ophthalmology (IRB 00008855 Société Française d'Ophtalmologie IRB#1) because the Committee did not find any challenge against the medical and scientific rules of ethics, as accepted in France.

- Consent for publication : Not applicable

- Availability of data and materials: The supporting data can be consulted on request from the corresponding author and can be found in the Department of Ophthalmology at Cochin Hospital, AP-HP, Paris.

- Competing interests : The authors declare that they have no competing interests

- Funding: Sources of public and private financial support, including organization's name, city, and country = Nothing to declare.

- Authors contribution :

- ME interviewed the patients, collected, analyzed and interpreted the patient data regarding their perception after cataract surgery performed in an open-space operating hall.

- DM performed the interventions, interpreted the data collected from the patients and was a major contributor in writing the manuscript

- CB performed the interventions and supervised the collection and the analyzation of data.

- AB performed the interventions, interpreted the data collected from the patients and was a major contributor in writing the manuscript.

All authors read and approved the final manuscript."

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Table

Results of the questionnaire

During your surgery, apart from your exchanges with your surgeon and his team, did you hear other conversations?	YES	NO		
	6% (n=15)	94% (n=295)		
If yes, did these conversations disturb you during your surgery?	Not at all	A little	A lot	IDK
	6% (n=15)	0% (n=0)	0% (n=0)	0% (n=0)
During your surgery, did you hear any noise unrelated to your procedure ?	YESI	NO		
	15% (n=37)	85% (n=213)		
If yes, did these sounds bother you during your surgery?	Not at all	A little	A lot	IDK
	12% (n=29)	3% (n=7)	0.4% (n=1)	0% (n=0)
Did you know before the beginning of your surgery that your procedure would take place in an open-space operating hall ?	YES	NO		
	21% (n=52)	79% (n=198)		
If yes, was it ...	Worrisome	Reassuring	Indifferent	
	0% (n=0)	6% (n=15)	14% (n=35)	
Did you realize that other patients were present in the open-space operating hall?	YES	NO		
	68% (n=170)	32% (n=80)		
If yes, at what point during the surgery ?	Before the procedure	During the procedure	After the procedure	
	64% (n=159)	4% (n=10)	1% (n=2)	
Overall, did you feel any discomfort related to the fact that your surgery was performed in an open-space operating hall?	Not at all	A little	A lot	IDK
	95% (n=237)	4% (n=10)	0.4% (n=1)	1% (n=2)

Figures

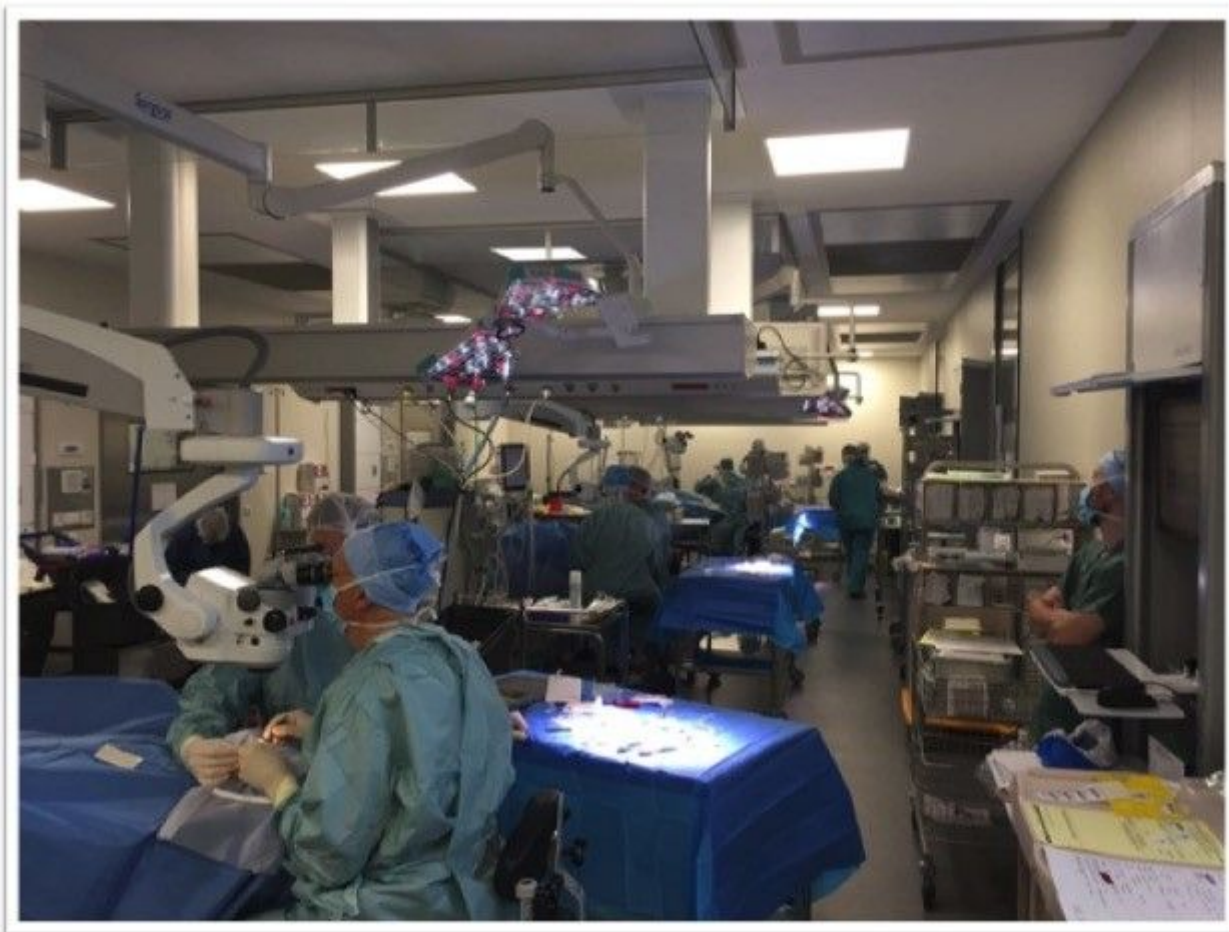


Figure 1

Open-space operating hall. Cochin Hospital, Paris. 2017.