



## Is Unimanual Phacoemulsification a Sensible Technique, as an Alternative procedure or a Transitional step Towards Bimanual Phacoemulsification for the Beginners?

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### Abstract

*Aim of this study is to find out whether it is useful to do unimanual technique, instead of straight away proceeding to bimanual technique while converting from Small Incision Cataract Surgery(SICS), to Phacoemulsification technique, or from Extra capsular Cataract Extraction (ECCE) to Phacoemulsification*

*Materials and Methods:* Consisted of a prospective study, of 100 patients, with cataract, who were operated by the Unimanual technique of (explained exclusively in our study) phacoemulsification with intraocular lens implantation (IOL).

*Results of this Unimanual technique were assessed and tabulated to appraise and instruct the beginners of phacoemulsification to arrive at the appreciable and accurate accomplishment of the phacoemulsification procedure.*

*Conclusion was that the unimanual technique of phacoemulsification is definitely a sensible, and an apt procedure to be followed before proceeding to a bimanual technique of phacoemulsification and can also be used as an alternative method for bi-manual phacoemulsification.*

### Relevance of the study

In most of the teaching institutes the postgraduates do not start the bi-manual technique of phacoemulsification as their primary procedure of learning cataract extraction.

They are in fact allowed to practice the primary steps of SICS and/or ECCE. Later on they will be allowed to perform SICS or ECCE independently, under the supervision of a senior ophthalmologist.

As soon as they learn these two basic procedures they will be eager to learn bi-manual technique of phacoemulsification, which needs a lot of skill and dexterity. Instead of straight away venturing into this bimanual technique which demands extraordinary skill, there is necessity for an intermediate step, which requires less skill but helps to attain the same result which is expected in the bi-manual technique of phacoemulsification

done by an experienced ophthalmologist. Hence this study, thus smoothens the learning curve of an aspirant ophthalmologist, while converting from the basic techniques of SICS or ECCE to Bi-manual Phacoemulsification procedure.

### **Aim**

Aim of the study is to find out whether the intermediary step of uni-manual technique of phacoemulsification is possible at all, if possible, is it scientific enough to achieve good result, so that it can be passed on to the progeny, as a sensible technique to be safely performed on the cataract patients. Aim of this study was also to find out whether this technique forms an easy and convenient stepping stone to perform bi-manual phacoemulsification on a later date. Assessment of benefit of these procedure also were done to see whether this method can be recommended to be done independently, rather than promoting this procedure as a stepping stone for bi-manual phacoemulsification. The results, thus obtained and tabulated, were utilized to guide the beginners to help in achieving best possible results in phacoemulsification

### **Materials and Methods**

The patients selected for this study were the patients who walked into the out-patient departments of Vidya Eye Hospital Vijayanagar Bangalore. The patients in the study had come for cataract operation from January 2010 to June 2017. *Unimanual technique* of Phacoemulsification was done on all these 100 patients.

The method followed in our exclusive method of unimanual phacoemulsification was as described below. The operations were performed under topical anaesthesia. In all the cases clear corneal incisions were made. The study included both the groups, which underwent, rigid 5.25mm optical diameter Intraocular lenses and foldable lenses.

The clear corneal incision was made at 12 'o' clock meridian by using 2.8mm keratome blade, trypan blue was injected into the anterior chamber to stain the anterior capsule, through the same 12 o clock incision, viscoelastic substance was used to form the Anterior Chamber. Cystitome made out of 26 gauze needle was used in all the cases to do CCC (Continuous curvilinear capsulorhexis). Hydro dissection, hydrodelineation and hydrodelamination were done as described in the standard textbooks.

Later on phacoemulsification was done followed by intraocular lens implantation.

Phacoemulsification procedure was conducted through the 12 'O' clock meridian. Trenching of the nucleus was done from 12 'o' meridian to 6 'o' clock meridian of the nucleus of the crystalline cataractous lens. 90 degree rotation of the nucleus was achieved either through the phacoemulsifier probe, or lens dialer. In some cases the rotation was achieved by using cystitome prepared with 26G needle. Later trenching is continued so as to produce four quadrants. In cases where the lenses are hard and leathery an iris repositor with 26G needle were used to break the nucleus into pieces. These pieces are later phacoemulsified through phaco 2 module of the phacoemulsifier. The cortical matter was removed completely by irrigation and aspiration. The cortical matter which is located at 12 'o' clock meridian was removed by using bent bi-way cannula. The whole procedure and all the manouvres were done through the 2.8mm incision done at 12 'o' clock meridian.

**Chart describing the salient differences between the uni-manual procedure followed in our study and the standard Bi-manual phacoemulsification techniques**

Particulars	Uni-manual	Bimanual
Basic Technique	Only one hand of the surgeon being active during phacoemulsification. The other hand engaged only in stabilization of globe.	Both the hands are active
Anaesthesia	Topical – Preservative free 2% Xylocaine	Topical- Preservative free 2% Xylocaine
Incision	2.8 mm incision only at 12 o’ clock	2.8 mm incision at 12 o’ clock; 1.5mm incision at 3 o’ clock and 9 o, clock (side ports)
Removal and Re introduction of Phacoemulsifier	Removal of phacoemulsifier after initial trenching, done to rotate the nucleus by using cystitome/dialer. Re introduction of phacoemulsifier to complete trenching	Once the phacoemulsifier is introduced, it is removed only after the complete phacoemulsification. Rotation of nucleus is simultaneously assisted with cystitome/chopper
Nucleus division	Done after 90% trenching is completed	Done after 65% to 75% of trenching is done
Operative Wound leakage	Not observed	Observed through free side ports
Stromal hydration of incision	Was not done	Was done for side ports
Cortical wash	Done by using single incision (12o’clock). Bent cannula for cortical matter at 12 o’ clock	Bimanual irrigation and aspiration through 3 o’ clock and 9 o’ clock side ports
Time taken	Average 35 minutes	Average 25 minutes
Assessment	Good technique while converting from SICS to phacoemulsification, for beginners – no complications are encountered in this transitional step.	Good to follow only after mastering Phacoemulsification.

The cases which were treated by this uni-manual technique were postoperatively assessed by using the following parameters, stability of the anterior chamber during and after the procedure, corneal clarity, posterior capsular rupture, residual cortical matter, post-operative vision after 7<sup>th</sup> post-operative day, time duration for the surgical procedure.

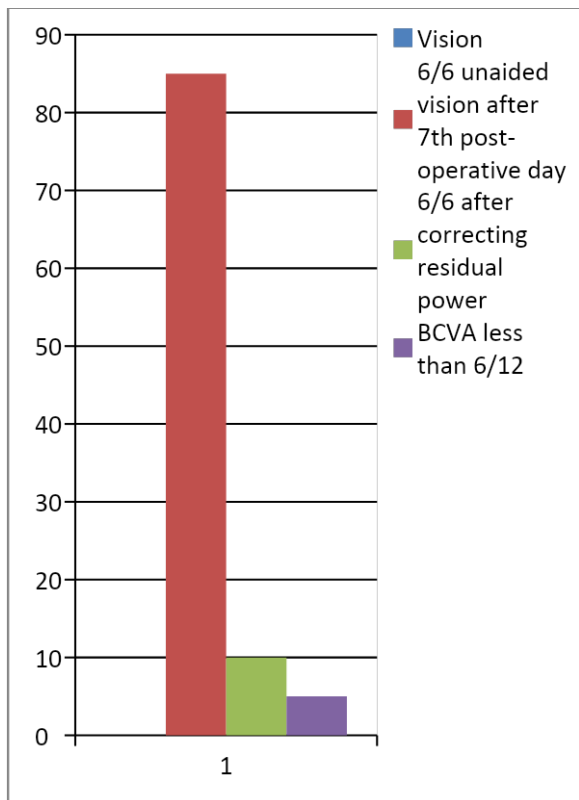
**Results**

It is very important in this study to assess the results, carefully, critically and rather crucially so that we will be able to arrive at a non-controversial conclusion so that it will be helpful for the beginners to do phacoemulsification confidently with a clear hope of achieving good results.

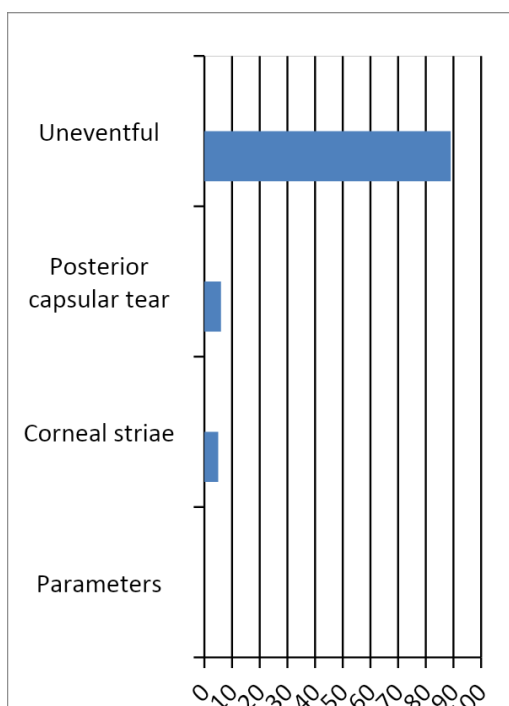
Post-operative Vision	Number of Patients
6/6 unaided vision after 7 <sup>th</sup> Post-operative day	85
6/6 after correcting residual power	10
BCVA less than 6/12	5

Parameters	Number of patients
Corneal Striae	5
Posterior Capsular Tear	6
Uneventful	89
Dislocation of Lens into Vitreous	0

After careful assessment of the results of all the 100 cases in our study, we observed that 85 patients had 6/6 unaided vision after the 7<sup>th</sup> post-operative day. 15 patients had sub normal unaided vision, out of which 10 patients were able to attain 6/6 vision after correcting the residual power. 5 patients in our study had best corrected visual acuity of 6/12. The reason for this lesser vision was either lens tilt astigmatism, and recurrent uveitis causing mild macular oedema.



**Figure 1.X-** Postoperative Vision Y- no. of patients



**Figure 2 X Axis -** No. of patients Y-Parameters

**Discussion**

This procedure needed a lot of determination and courage to execute, as it is an innovative phacoemulsification method which is not acceptable by the experts in the field. Anyway we

designed this clinical study purely for the benefit of the beginners so that it becomes a strong stepping stone for them to confidently move on to the bimanual technique easily.

As the procedure was less cumbersome and highly convenient the residents found it very easy to perform. As the co-ordination of both the hands was not necessary, the beginners found it much easier to get adjusted to the procedure of phacoemulsification when they switched over from the Small Incision Cataract Surgery to Phacoemulsification procedure. In fact it was considered as a good transitional step in their journey to bimanual phacoemulsification.

**Conclusion**

So, with this study most of the qualified ophthalmologists who are already practicing bimanual phacoemulsification and the residents who planned to learn phacoemulsification for the first time, categorically agreed that it is a convenient transitional step towards the bimanual phacoemulsification procedure.

Thus our study concluded that unimanual phacoemulsification is a sensible transitional step towards the procedure of bimanual phacoemulsification. Hence it can be recommended for the beginners, and can also be used as an independent procedure to perform phacoemulsification. This technique also helps in mitigating and decreasing the complications of phacoemulsification when the beginners try to learn this new technique.

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