

- Trabeculectomy is considered the gold standard of glaucoma operations uptill now.

🌿 Ultrasound biomicroscopy (UBM) is an imaging technology that uses high-frequency ultrasound and thus allows visualization of the anterior portion of the globe in microscopic resolution.

🌿 It is independent on the clarity of the optical media so it is suitable for diagnosis and research on the various forms of glaucoma.

AIM OF THE WORK

Evaluation of the filtering bleb after trabeculectomy using ultrasound biomicroscopy (UBM) guided by the clinical examination of the patient eyes.

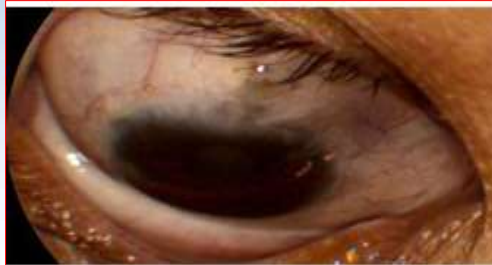
Patients And Methods

- This study was performed upon 23 eyes of 17 patients (35.3% males and 64.7% females) who achieved trabeculectomy, the studied eyes were examined ophthalmologically and after taking the history they were divided into three groups.

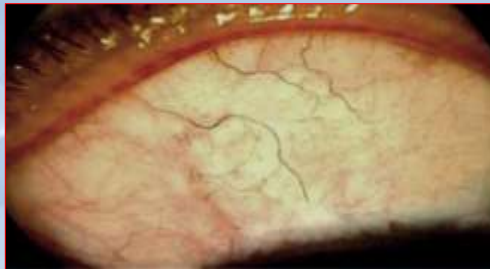
- *Group (A) completely successful blebs* was defined as a last recorded IOP ≤ 18 mmHg without the need for antiglaucomatous medication.
- *Group (B) qualified successful blebs included;* was defined as an IOP ≤ 18 mmHg under topical antiglaucomatous medication.
- *Group (C) failed blebs included;* when IOP > 18 mmHg despite topical antiglaucomatous therapy.



Type 1 bleb (high, thin and diffuse), (bleb no. 10).



Type 2 bleb (flat a vascular bleb), (bleb no. 5).

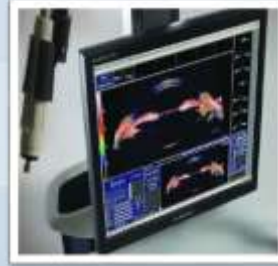


Type 3 bleb (flat, vascularized), (bleb no. 8).



Encapsulated bleb, (bleb no.20).

The three groups were submitted to ultrasound biomicroscopy (UBM)



Vu Max sonomed ultrasound biomicroscopy (UBM) system.



Eye cups of different sizes for UBM.



UBM Probe with 50 Mhz transducers.



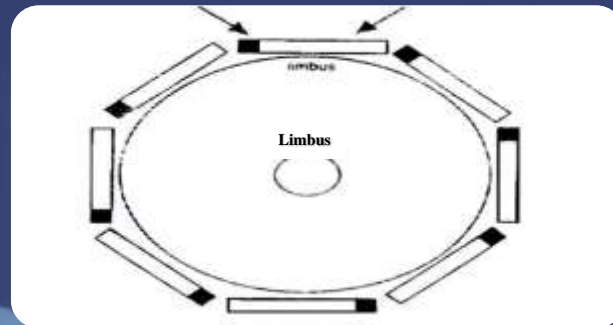
UBM scanning procedure

Examination the vertical axis; the probe marker was directed towards the sclera at the same hour to be examined and examination of the transverse axis; the probe marker was directed to the counterclockwise side.



Radial sections of the globe are performed with the probe marker on the scleral side at the same hour to be examined.

Marker on probe Plane of transducer motion



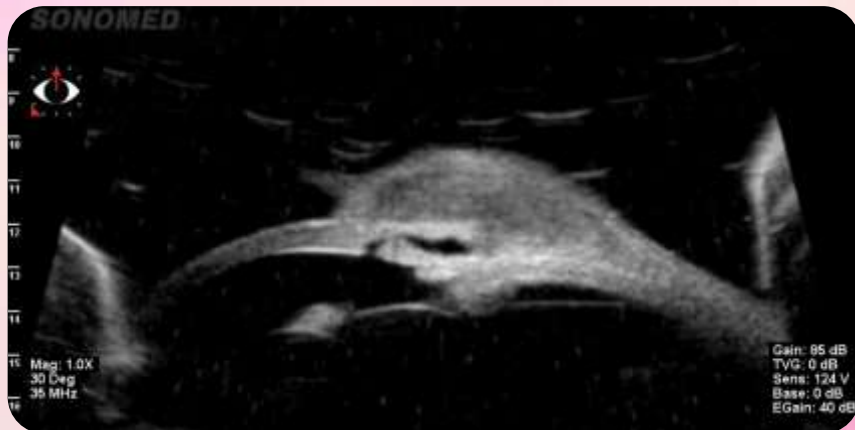
Transverse sections of the globe are performed with the probe marker on the counterclockwise side.

The scanning parameters were evaluated

- A. Intrableb reflectivity.
- B. Internal ostium of the bleb.
- C. Filtering bleb height.
- D. Filtering bleb breadth.
- E. Peripheral iridectomy (PI).
- F. Formation of cavernous fluid filled spaces (microcysts).
- G. Tract under the scleral flap.

The intrableb reflectivity

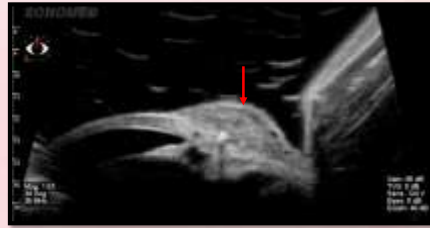
- This was classified according to its similarity to the scleral reflectivity of the same UBM image and standard intra bleb image for low reflectivity.
- The image was classified as having *low reflectivity* when it was isoechoic compared with that in the standard intra bleb image, of *medium reflectivity* when it was found to lie between the reflectivities of the standard image and the sclera and of *high reflectivity* when the reflectivity of a particular image was isoechoic or hyperechoic compared with that of the sclera demonstrated in the same UBM image.



The standard UBM image for low bleb reflectivity, bleb no.19.



Moderate reflectivity (red arrow) in bleb no. 1.



low reflectivity (red arrow) in bleb no. 12.



High reflectivity (red arrow) in bleb no. 3.

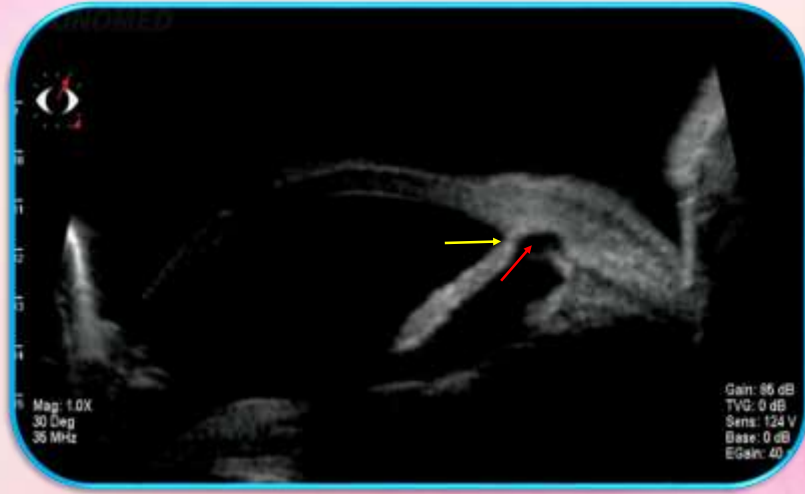
Ostium evaluation: the ostium was evaluated as regard visibility (visible or invisible) and patency (patent or occluded).



Visible and patent ostium in bleb no. 7.

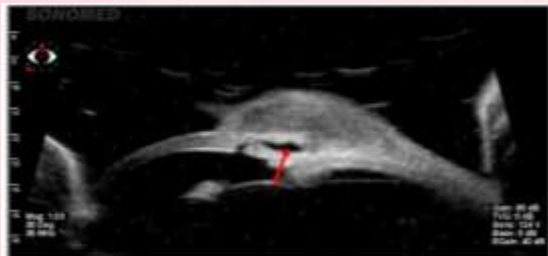


Invisible ostium in bleb no. 20.

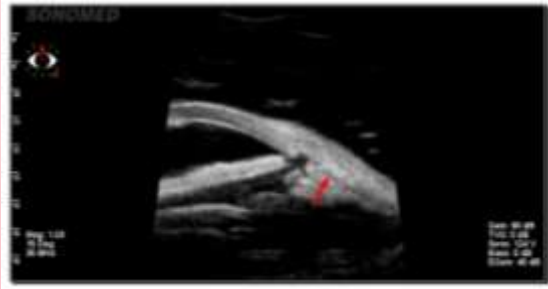


UBM image for visible and patent ostium (red arrow) with iris incarceration at the anterior edge of the ostium (yellow arrow) in bleb no. 6.

Tract under the bleb



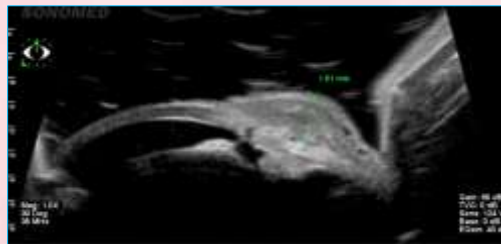
A visible tract under the scleral flap (red arrow) of bleb no.19,



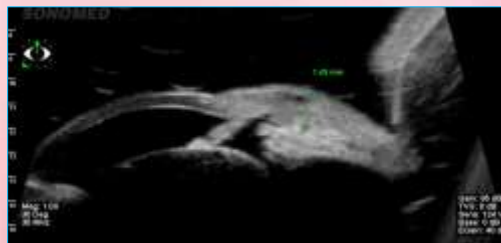
A poorly visible tract under the scleral flap (red arrow) of bleb no.15, patient's IOP=10mmHg on dorzolamide HCL 2% +timolol 0.5% and brimonidine tartrate 0.2%.

Bleb height was defined as the length of the longest line from the surface of the sclera to that of the bleb, measured perpendicular to the sclera.

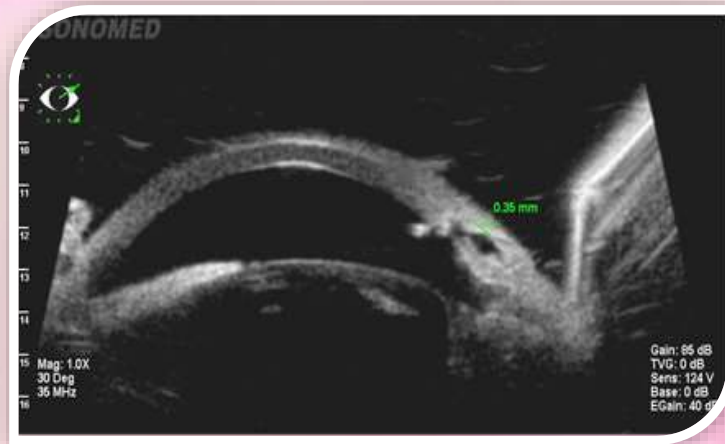
**Bleb
height**



UBM image for measurement of the bleb height in bleb no.12,height of the bleb = 1.91 mm.



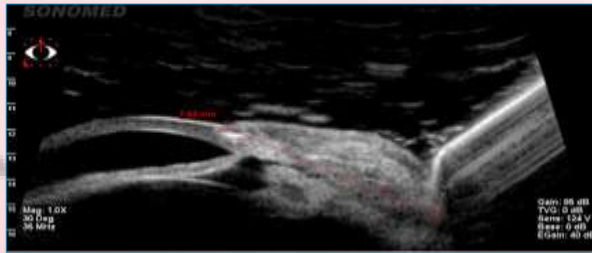
UBM image for measurement of the bleb height in bleb no.11 ,height of the bleb = 1.43 mm.



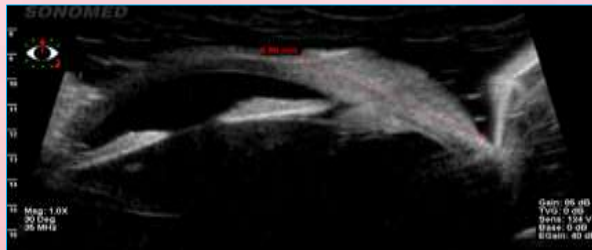
Measurement of the bleb height in bleb no. 8, height of the bleb = 0.35 mm (cut flap).

- *Breadth of the bleb*; was defined as the longest line, which is perpendicular to that which is used for measurement of the bleb height. This line connects a point, which is the beginning of the conjunctival bleb at the corneal side to a point where the conjunctival bleb ends at the scleral side.

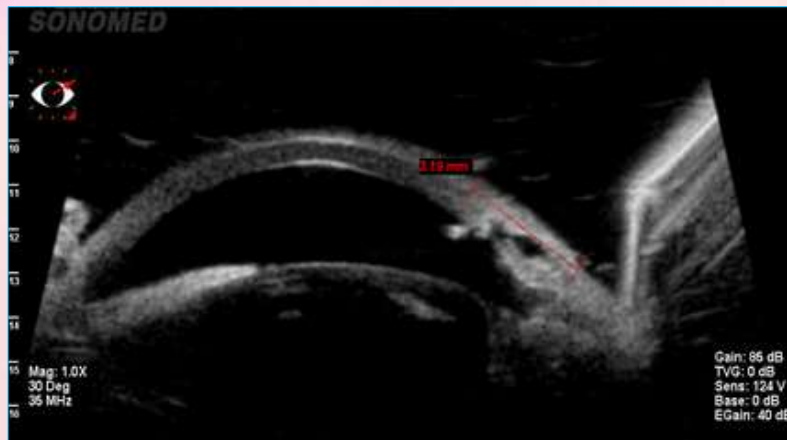
**D- BREADTH
OF THE BLEB:**



UBM image for measurement of the bleb breadth in bleb no. 17, breadth of the bleb = 7.93 mm.



UBM image for measurement of the bleb breadth in bleb no. 21, breadth of the bleb = 6.60 mm.



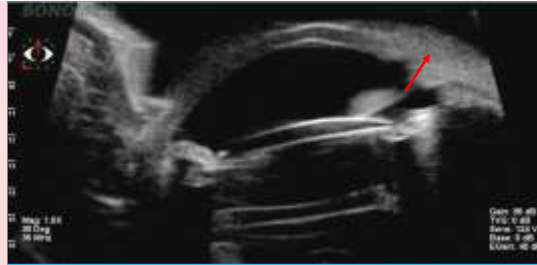
**Masurement of the bleb breadth in bleb no.8,
breadth of the bleb = 3.19 mm.**

- *Microcyst evaluation*; formation of cavernous fluid filled spaces was evaluated whether suprascleral fluid filled small spaces or lacunae (microcysts) and it was the most evident or subconconjunctival fluid space (SCFS) as regard their presence or absence.

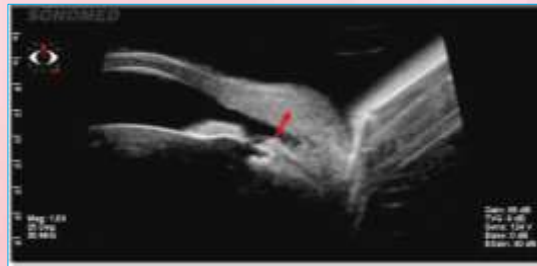
CAVERNOUS FLUID COLLECTION



Cavernous fluid collection bleb no. 11.



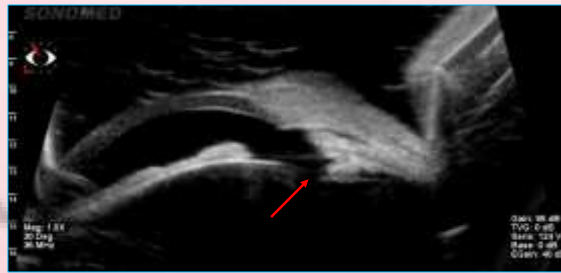
Microcysts (red arrow) in bleb no. 5.



Absence of microcysts (red arrow) in bleb no. 1.

- *Peripheral iridectomy (PI)*; the peripheral iridectomy was evaluated as regard patency (patent or inpatient) and position from the iris root (outer ,middle or inner 1/3).

**PERIPHERAL
IRIDECTOMY
(PI)**



UBM image for visible PI (red arrow) in bleb no. 10.



UBM image for invisible PI (red arrow) in bleb no.20.



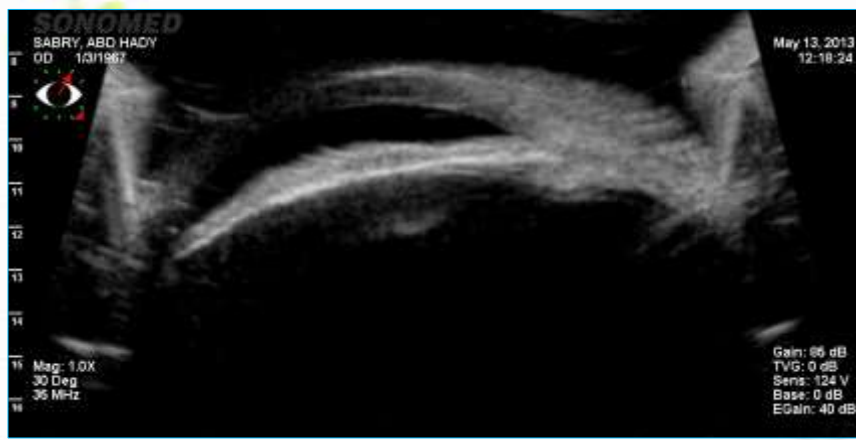
Case 1

Male patient with bleb no.6 and UBM shows low intrableb reflectivity, visible and patent ostium, bleb height 1.93 mm, bleb breadth 6.05 mm, visible PI, present microcyst and visible tract under scleral flap.



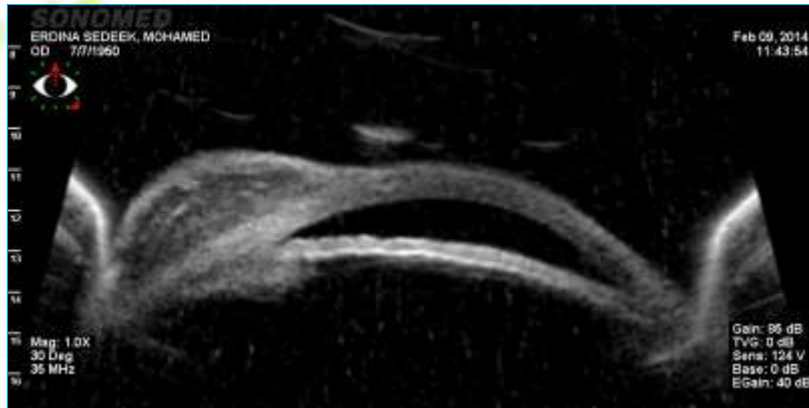
Case 2

Male patient with bleb no.9 and UBM shows low intrableb reflectivity, visible and patent ostium, bleb height 1.43 mm, bleb breadth 7.51 mm, visible PI, present microcyst and visible tract under scleral flap.



Case 3

Female patient with bleb no.18 and UBM shows low intrableb reflectivity, visible and patent ostium, bleb height 1.53 mm, bleb breadth 7.43 mm, visible PI, present microcyst and visible tract under scleral flap.



It was possible to measure the height and the breadth of the blebs, and evaluate the reflectivity inside .

Also it was possible to examine the ostium and the peripheral iridectomy and to follow the tract under the scleral flap and evaluate the presence and absence of microcysts .

- After we correlated the UBM criteria and the bleb function previously evaluated depending on:

History and clinical examination.

We found a significant statistical positive relationship between some **UBM** criteria as:

intrableb reflectivity, tract under the scleral flap, filtering bleb height and breadth, the presence of cavernous fluid filled spaces (microcysts), internal ostium (visibility and patency) and the **bleb function**.

- **Clinically**

- *Group (A) completely successful blebs* **UBM:** Low or moderate intrableb reflectivity, visible ostium, bleb height (1-1.5 mm or 1.5-2mm), bleb breadth (6-7mm or >7mm), visible PI, present microcysts and visible tract under the scleral flap with good bleb function.

Group (B) qualified successful blebs **UBM:** •

Moderate or high intrableb reflectivity, visible ostium, bleb height (<1mm or 1-1.5mm), bleb breadth (<6mm or 6-7mm), visible PI, present or absent microcysts and visible or poorly visible tract under the scleral flap with fair bleb function.

Group (C) failed blebs

UBM: High intrableb reflectivity, visible or invisible ostium, bleb height (<1mm), bleb breadth (<6mm), visible or invisible PI, absent microcysts and poorly visible or absent tract under the scleral flap with poor bleb function.



Conclusion

- UBM is good tool to study the functional anatomy of the filtering bleb and the UBM criteria can predict the degree of complete success, qualified success and failure of the filtering bleb after trabeculectomy without clinical evaluation.

