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**Postsurgical Intra Ocular Pressure Control Comparing Deep Sclerectomy Vs Trabeculectomy Both With MMC in Tripoli Eye Hospital- 2021-2022**

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**Abstract**

*Background:* To evaluate post-operative outcomes of Trabeculectomy with MMC (TRAB) compared to Deep sclerectomy (DS) in terms of achieving the target intraocular pressure (IOP) 10 -15mmHg.

*Methods:* This study retrospectively analyzed 30 eyes divided between TRAB and DS with MMC, performed in Tripoli Eye Hospital 2021-2022 respectively as registered and reviewed via hospital records. follow up was done during the period of six months. Patient were all examined and diagnosed as cases of advanced uncontrolled open angle glaucoma, any history of chronic illness as well as history of Glaucoma filtration surgery were excluded. Surgical success was defined as IOP 10-15mmHg in the first day post op until the period of six months without any addition of post-operative medication or needling, bleb repair was needed during the follow up period

*Results:* Strikingly, the majority of TRAB and DS groups had 80% preoperative IOP of > 20mmHg on triple treatments or more, significant IOP decline had been noticed in the 1<sup>st</sup> day and 1<sup>st</sup> month post op to less than or = 10-14mmHg, (60%-40%) respectively in both surgeries. However, the IOP of <10 up to 15 maximumly in the 1<sup>st</sup> to 6<sup>th</sup> month postop 99% lower in TRAB Group compared to DS Group, which was 33% on the third to the sixth month additionally we add one medication maximum 2 drops in DS group so the IOP controlled back to be <than 20mmHg.

In terms of complication post operatively had been noticed only in 3 patients from TRAB group, only one case was low IOP of 2mmHg with FAC grade 1 managed by Atropine ED and hourly steroid, the other 2 cases had increase IOP that controlled with bleb revision+MMC otherwise no more complications noticed during the follow up period.

*Conclusion:* Post-surgical outcome of DS and TRAB with MMC suggested almost similar capability of IOP control achievement between <10\_15 mmHg, 73.1% during the first month

without any treatment or intervention in the majority of cases, although, IOP <10-15mmHg was remarkably more controlled in the TRAB group up to the 6<sup>th</sup> month in comparison to DS group on the long-term duration which fail to achieve the target IOP. When it comes to the complication on 3<sup>rd</sup> days in TRAB group >DS which was fortunately IOP controlled back to normal, DS group unfortunately on the 3<sup>rd</sup> month registered high IOP that managed with drops before 6 months in Tripoli Eye Hospital.

**Keywords:** Glaucoma, Non-penetrating surgery, Deep sclerectomy, Trabeculectomy.

### **Introduction**

Glaucoma is the silent thief of vision for decades as its considered the most common cause of irreversible blindness worldwide and even in Libya according to a study had held in 4 different cities 2013, represents the most common causes of loss of vision after cataract was due to glaucoma 24%. Since the only modifiable factor in this devastating blinding disease was found the Intra ocular pressure (IOP), So the key is controlling it to stop the disease progress, however, its control must be either medically ,laser treatment or surgically .

In this comparative study all cases were in the advanced stage of glaucoma on triple or more medication with lake of IOP control and the disease was progressing by the time, as a result surgical intervention was the only option to be applied.

In Tripoli Eye Hospital the only surgical methods were available (conventional trabeculectomy (TRAB) or TRAB augmented with MMC and Ahmed Valves. Recently, nonpenetrating glaucoma filtration surgery(NPGFS) has been introduced at Tripoli eye hospital Since 2021, like Deep sclerectomy (DS) with MMC (mitomycin; anti metabolites) its Alkylating agent that inhibit DNA replication to help counter fibroblasts involved in scarring process at the filtrating surgical site, thereby improving surgical success according to UK NICE guidelines NG81 recommendations. Although, TRAB+ MMC is considered the gold standard surgical method in this research we would like to compare it to NPGS to prove the efficacy and safety to our patents in the hospital in order to achieve the best target post operative IOP results.

This study explore the 6month period target IOP control achieved post surgically comparing TRAB +MMC to DS+MMC at a single tertiary eye hospital in Tripoli Libya.

### **Methods:**

A comparative retrospective study was held in Tripoli Eye Hospital in 2021\_2022 analysing 30 eyes were operated in the hospital divided between Trabeculectomy ( TRAB) and Deep Sclerectomy (DS) with Mitomycin respectively, as registered and reviewed via hospital records, follow up period was six months. The participants were randomly selected in the glaucoma clinic all of them were advanced primary open angle Glaucoma(POAG) with lake of IOP control despite using triple treatment or more. All preoperative assessments were performed, start from

visual acuity, slit lamp examination, Gonioscopy, funduscopy, ends with diagnostic investigation like (pachymetry, visual field 24'-2 for V/A <6/60, 10'-2 for advanced cases, NFL OCT). All patients who were 2ry open or closed angle Glaucoma, past medical history, or previous glaucoma filtration surgery were excluded.

The surgeries were performed by different surgeons following the same surgical technique and guidelines of both previously mentioned surgeries. Surgical success was defined as IOP  $\leq$ 10-15mmHg since day one and maintained to the 3<sup>rd</sup> till 6<sup>th</sup> months after surgery without medication needling or bleb revision the outcome addressed both IOP control and changes as well as managing post op complications.

Statistical analysis was performed by SPSS 16, DATA introduced (ID, AGE mean was  $\leq$ 50-70yo, BCVA 6/24-6/60 93.2 %, 6.7 % <6/60 Snellen chart, Gender 76.7% were female while 23.3% male, preoperative IOP 80% > than 20mmHg, gonioscopy (OAG), type of surgeries (TRAB, DS+MMC) and post operative IOP 1<sup>st</sup> day, month, 3<sup>rd</sup> month, 6<sup>th</sup> month follow up, Post op complications 90% no complications. Pearson chi-square test were used to assess differences between 2 surgical groups for baseline variables. A P value was <0.05 was considered statistically significant. All conducted with adherent to the tents of the Declaration of Helsinki.

#### Surgical technique of T trabeculectomy with mitomycin C

Under complete Aseptic technique. A 8-0 Vicryl corneal traction suture was performed all the surgical area was exposed conjunctival peritomy with tenon fornix based approach flab created, then hemostasis achieved by cauterisation. A 4x4 scleral flab 2/3 thickness, next MMC 0.2mg/ml, small sponge socked in inserted beneath the flab for 2 minutes, next frequent copious irrigation. A paracentesis is performed and the anterior chamber was entered. Ostium fashioning using Kelly punch, followed by peripheral iridectomy, 10-0 nylon suture was used to close the scleral flab at apices next checking the flab leak by saline through paracentesis if it needs more stitches approximation of the conjunctival with Tenon using 8-0 vicryl last hydration of paracentesis, sub conjunctival steroid with antibiotic injected.

#### **Surgical technique of Deep sclerectomy +MMC**

Corneal traction suture 8-0 Vicryl was placed superiorly followed by fornix base conjunctival flab creation, cautery to achieve hemostasis, then 4x4mm scleral flab was done half thickness limbus-based superficial flab and advanced 1mm to the clear cornea, 0.2 mg/ml MMC soaked sponges inserted for 2minutes applied posteriorly under conjunctiva and scleral flab then copious irrigation by BSS. Next, deep scleral flab 3x3mm had been created to the level of Schlemm's canal, de roofing with with removal of fibers at Trabeculodesment's window, percolation of aqueous will be obvious after that tight superficial scleral flab sutured with 10-0 nylon then conjunctival sutured with 8-0 vicryl tightly. Sub conj steroid with antibiotic injected.

**Results:**

A total 30 eyes analyzed, which included 15 deep sclerectomy group and 15 TRAB+MMC group, Table (1).

Table (1): Types Of surgical procedures

		typeofS			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	TRAB+MMC	15	50.0	50.0	50.0
	DS+MMC	15	50.0	50.0	100.0
	Total	30	100.0	100.0	

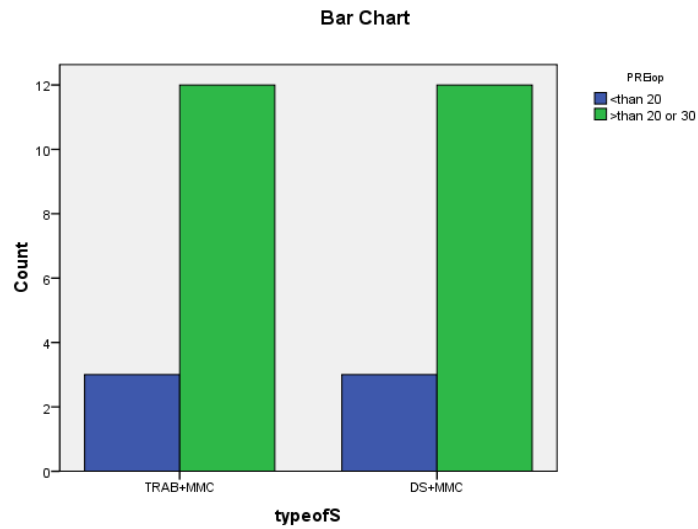
The most frequent age group is between 50-70 years old ( 86.7%), table (2).

Table (2): Age group

		AGE			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	30-40yo	3	10.0	10.0	10.0
	50-70 yo	26	86.7	86.7	96.7
	20 or less	1	3.3	3.3	100.0
	Total	30	100.0	100.0	

**Preop- IOP**

TRAB+MMC and DS+MMC groups preoperative IOP which 80% >20mmHg ( chart (1) that shows almost 73% IOP reduction postoperative, in which was striking reduction almost similarly in both previously mentioned procedures in the early days post op.



TRAB+mmc VS DS +mmc post operative IOP from 1<sup>st</sup> day up to the 6<sup>th</sup> month table (3) and charts (2,3) respectively :

TRAB+MMC vs DS+MMC post operative IOP target control since day one till the 6<sup>th</sup> month follow up represents TRAB group significantly reach the target IOP control

Post operative IOP	TRAB+MMC	DS+MMC	P value
1 <sup>st</sup> day 8-10mmHg 10-15mmHg >20mmHg	55.6% 50% 0%	44.45 50% 0%	0.52
1 <sup>st</sup> MON 8-10mmHg 10-15mmHg >20mmHg	50% 60% 0%	50% 40% 13.3%	0.09
3 <sup>rd</sup> MON 8-10mmhg 10-15mmHg >20mmHg	66.7% 33% 0%	33.3% 46.7% 20%	0.04
6 <sup>th</sup> MON 8-10mmHg 10-15mmHg >20mmHg	80% 20% 0%	20% 40% 66%	0.01

between 10-15 mmHg without medication compared to deep sclerectomy group. The p value is significant since 1<sup>st</sup> month which was <0.5.

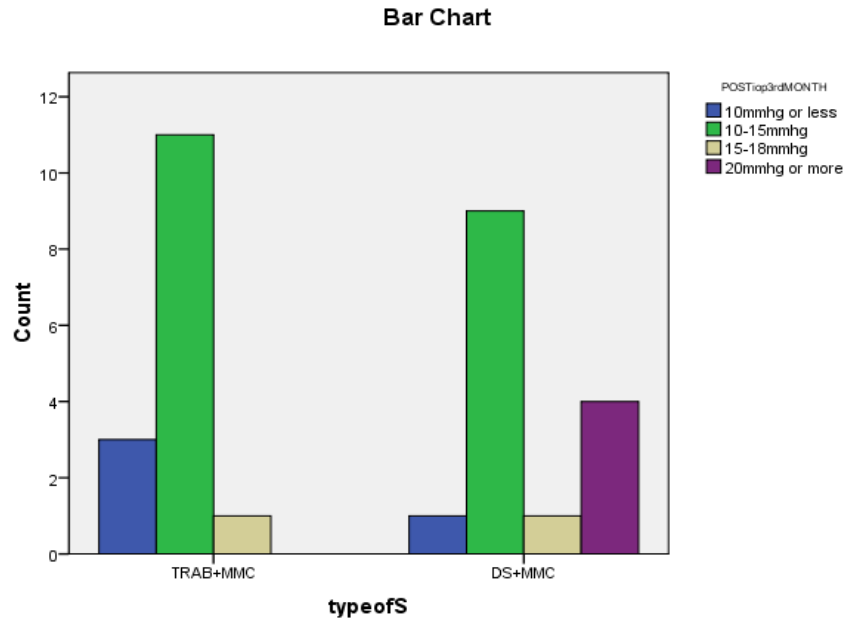


Chart (2): PostOperative IOP in 3<sup>rd</sup> month

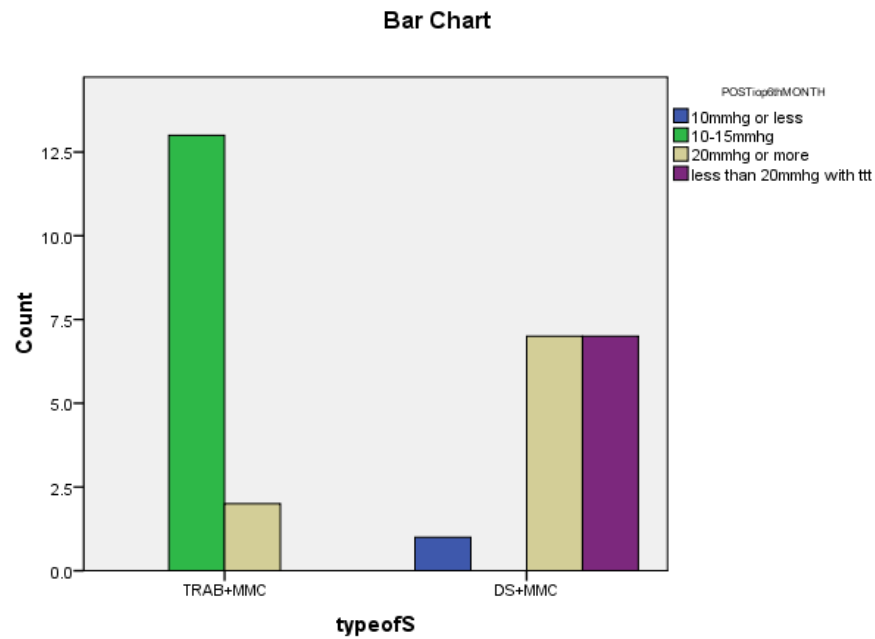
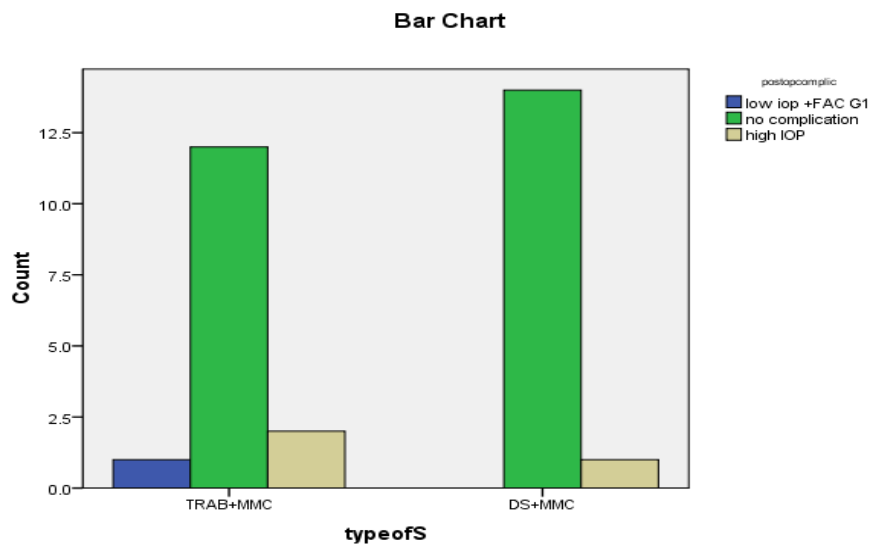


Chart (3): PostOperative IOP in 6<sup>th</sup> month

**Post operative complications**

Generally, no complications had observed in deep sclerectomy group post operative as it's common complications appears intraoperative which conclude, either trabeculodescemet'smeshwork (TDM) perforation, or difficulties in identification of Schlemm's canal that fortunately both hadn't occurred. Nevertheless, DS group fail to maintain target IOP additionally to the high IOP by the end of 1<sup>st</sup> month that controlled by adding one or maximum 2 drops which show statistic drops reduction. However, in TRAB group luckily 80% had no complications only 3 cases; one case with FAC G1 in which managed with Atropine 1% 1x4 and steroid drops after one week the A/C maintained the other 2 patients presented with High spikes of IOP  $\geq 25$ mmHg that managed with bleb revision and poster post op MMC injection after 2 weeks then the IOP decline to normal had been noticed, chart (4).



**Dionscuti**

The concept of non penterating glaucoma surgery originated in 1964 when Krasnov published his first report in sinusotomy<sup>(1,2)</sup>, this operation consisted of removing a lamellar band of sclera, opening the schlemm's canal over 120 from 10 to 2 o'clock. However, it is never become popular as it was difficult procedure. In the late 1960s and the next decades, Trabeculectomy became the gold standered procedure fo filtering surgery<sup>(3,4,5)</sup>. Currently, DS with ab externo trabeculotomy and viscocanalostomy are the most commonly used as NP procedures<sup>(6)</sup>.

There were limited studies comparing augmented TRAB vs DS

Post operative IOP control, most of studies focus on comparison of viscocanaloplasty vs TRAB or focus on favorable of IOP and drug reduction, bleb morphology or safety and efficacy of TRAB+MMC vs TRAB+OLOGEN implant or combined procedures<sup>(7,8,9)</sup>. Recently, most of innovative technique focuses on the least invasive with more safety with the best IOP control, such as Minimal invasive procedure (MIGS). However, 7 years retrospective study comparing TRAB vs DS in POAG, analyzed 79 eyes (41 DS and 38 TRAB) conclude that TRAB+MMC, offered a better IOP control than DS for 7 years after surgery<sup>(10)</sup>.

While DS was converted to penetrating procedure with goniotomy, the success rate significantly increased. Another study in 2008 comparing both same previously mentioned studies, 93 patients represents IOP lowering effects of both were comparable at 36 months while at 48 months IOP post TRAB showed significantly higher success rate 72% compared 51% in DS. Randomised trials comparing NPGS to TRAB, NPGS was superior in safety profile but no agreement when it comes to efficacy.

### **Conclusion**

To conclude that TRAB+MMC achieved the best intraocular pressure success control on the long term duration follow up in comparison to deep sclerectomy+ MMC, which achieve the target IOP only in the early period then spikes of high IOP > than 20 mmHg registered after the 1<sup>st</sup> month that controlled by anti-glaucoma treatment to be  $\leq 21$  mmHg, however, post operative complication noticed in TRAB group which managed, to control the IOP one case with ATROPIN drops 2 cases with Bleb revision augmented with MMC, compared to DS no any complication had found like shallow anterior chamber, that makes the deep sclerectomy has high safety profile.

The sample analyzed it would be better to be larger, as well as the follow up period to be longer for many years so the result will be statically more sensible and accurate. However, in most previously comparative studies there were limitless either short duration or small sample. Moreover, some of the founded long retrospective studies represents the efficacy of TRAB+MMC IOP reduction compared to DS+MMC that have more safety profile with success on the number of anti-glaucoma treatment, which was considered in some studies surgical success. Some of confounding factors wasn't taken in to considerations such as race which might had an effect on the post operative pressure control and the failure rate.

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