REVIEW OF LITERATURE
First surgical assessment of glaucoma was done by Mckenzie (1835) and by Middlemore (1835) by paracentasis and scleral puncture, but the first successful procedure was done by Von-Grafe’s (1887) he did iridectomy. Critjett (1858) developed the operation of Iridesis.

The above operation did not control the glaucoma successfully so another series of attempts were made, the earliest of these were made by Dewecker with his anterior sclerotomy and by Argyll-Robertson (1876) who trephined behind the ciliary body. After that anterior sclerotomy by Herber (1903), partial sclerotomy and iridectomy by Lagrange (1906), Cyclo-dialysis by Heine (1906), Iridenclesis by Holtz (1907) and corneoscleral trephine of Elliot (1909), Iridenclesis by Holtz (1907) and corneoscleral trephine of Elliot (1909) and goniotomy of Barkan (1938) and Iridectomy with the cautery of Schies (1958).

The principle of Holth’s iridenclesis is to effect a filtering cicatrix along the piece of iris included in the scleral incision. There the stroma atrophies and works as a filtering wick through which aqueous seeps out of the eye into subconjunctival space. Thereafter the other significant advance ment came after Schie’s (1958) when he devised his procedure for cauterising the edge of wound.

After that the Surgical microscope had opened new horizons in glaucoma
surgery so, operation on ‘Trabecular meshwork’ in order to reduce IOP started receiving increasing prominence. Redmondsmith (1960) opened the trabecular tissue by passing a nylon thread along the canal of Schlemm via the ab-externo incision and by the further incision and by picking up the distal end of the thread, he ruptured the trabecular meshwork, by pulling on the thread like a bow. Allen and Burian (1962) passed an instrument into the canal of Schlemm via an ab-externo and ruptured the trabecular tissue Strachan (1967) and Harr’s and Dannheim (1979) have modified this further and now the operation of trabeculectomy abexterno has been well documented. Krasnov (1968) described the operation of sinusotomy or externalisation of the canal of Schlemm in cases in which the obstruction to outflow may be intrascleral.

Trabeculectomy or removal of trabecular meshwork was first reported by Sugar (1961) he termed his procedure as experimental trabeculectomy. Than later on Cairns (19668) had modified and done successful trabeculectomy.

It was thought previously that ‘trabeculectomy’ or removal of trabecular meshwork through an ab-externo incision (Cairns 1968) allows the aqueous to flow through the new exposed cut end of canal of Schlemm and than to leave the eye via the normal channels but the suggestions has been investigated by Cairns and others and it has been shown that the canal of Schlemm does fibrose after the
second possibility, is that, there may be drainage through the sides of scleral and corneal incisions which remain open following surgery. Once again, this is an unlikely method of drainage because according to Luntz, Freedman, Shin, Abrahamson suturing the flap will give the same result for control of I.O.P. as leaving the flap unsutured. That means that, if the sides of flap are well sutured there will be still good filtration and therefore this can not be the major way through which filtration occurs.

Another suggestion given by Cairns is that, filtration occurs through the cut ends of the collector channels in the sclera and this is one possibility which has not been fully investigated although the likelihood would be that cut ends would fibrose up in the same way as the cut ends of the canal of Schlemm fibrose.

Finally, according to the Luntz, the most likely explanation is that there is seepage of aqueous through sclera, in other words, that scleral tissue which is not full thickness sclera where the deeper part of sclera has been removed surgically is permeable to aqueous. This has been tested by Luntz in the laboratory by taking a 1 mm. disc of sclera, excising the deep layer of sclera, fixing 1 mm. disc of sclera in a container and then exposing that to 21 mm. of vacuum with the vacuum pump on the other side of the scleral button, he has a coloured fluid in contact with the scleral button. Twenty four hours he had seen the same coloured fluid on
the reverse side of the scleral button, and, if one calculated the amount of fluid present corresponds very well with the known flow of the aqueous in a normal eye. So, this is the most likely explanation for the method by with 'Trabeculectomy' functions.

Later on A.P. Nesterov, N.K. Federov & Y.E. Batmanov described simple sinus trabeculectomy and filtering sinus trabeculotomy which includes same feature of the sclerotomy reported by Nakajiwa Kanki and Takayama (1961) and of the trabeculectomy reported by Cairns and Watson (1968-69). A.E.A Ridgway, K. Rubistein and V.H. Smith performed trabeculectomy based on technique described by Watson (1969). In 86 glaucomatous eyes, they concluded the co-relation between the successful control in I.O.P by drainage bleb, supports the mechanism of action of trabeculectomy is similar to that of standard fistulizing procedure for glaucomas.

Trabeculectomy operation developed by Cairns (1968) was done in African eyes by Watson (1969) and Chattergee (1971). They concluded that tendency to excessive fibrosis was manifested clinically by a rapid fibrosis of the incidental filtering bleb, in some case did not effect the control of tension. This suggests that the internal drainage channels opened by trabeculectomy were not involved in the process of the fibrosis. Immediate bleb formation was considered to be due to leak at the edge of scleral flap which was not closed properly.
Trabeculectomy started by Sugar (1961), introduced by Cairns (1968) and modified by Watson (1969) has become an accepted part of the armamentarium of glaucoma surgery. It has been shown to succeed by means of external filtration into a well covered diffuse post-drainage bleb and it has been proved to be free of the troublesome early complications of previously devised filtering operations.

A.E.A. Ridgway suggest that when trabeculectomy fails, it does so soon after operation and almost always within one year of surgery. A followup of 1 to 3 years should give a true picture of success rate of the procedure in terms of control of I.O.P. He undertook study of 69 eyes in which I.O.P. was maintained in 60 out of the 69 eyes, bleb formed in 42 of the 69 eyes. In 49 eyes in addition to surgery, medical treatment was also given and in 2 eyes the I.O.P. increased above 21 mm of Hg., despite medical treatment. In 47 eyes, 23 were noted to have bleb at the first dressing 24 hours after surgery. He reported failure of control of I.O.P. by surgery alone in 21 eyes within 1 year of operation. A.E.A. Ridgway et al also observed that none of the blebs have developed dangerous characteristics and it is likely that the well covered diffused bleb of intact conjunctival - tenon is safer from late infections, perforation, encystment and that the blebs resulting from most other operation in common use today resulting in limbal bleb.
Arthur L. Schwarz and Douglas K. Anderson subjected 39 eyes with chronic simple glaucoma to surgery with a minimum follow up of 4 month they achieved success in 19 and failure in seven. According to them age greater than 60 years appears to have a favourable influence on the results presumably because of better healing capacity of the young which results in scarring down of the scleral and conjunctival flap. Their success was also associated with filtering bleb. Visual loss due to cataract was not a major problem.

Dannheim reported that without medication trabeculectomy controlled 60 of 100 eyes with open angle and with medication 58 of 100 trabeculectomy were originally designed for the purpose of allowing aqueous to drain via the cut ends of schlemm’s canal thus bypassing the impoermeable trabeculum. It seems to be another type of filtering operation having the advantage of reformation of anterior-chamber, but sooner or later the incidence of cataract formation and other complications occurred.

Luntz reported that post surgical course has been singularly complication free and he had not come any disadvantage of trabeculectomy. Only two eyes had a shallow anterior chamber on the first post operative day which reformed, one on the second day and one on the third post operative day with presssure patching. There was no button holing of the conjunctival flap, no malignant glaucoma, no
thin ischemic blebs and no eyes with late infection of the bleb. Two eyes following a combined cataract and trabeculectomy procedure had a small post operative hyphema which cleared by the third post operative day. There were no other complications at or following surgery. According to the luntz the less complication were due to tightly securing sutures (6 sutures) placed in the partial thickness scleral flap, because he thought that trabeculectomy acts by seepage of aqueous through sclera, in other words, that scleral tissue which is not full thickness sclera where the deeper part of the sclera has been removed surgically is permiable to aqueous.

There is also good evidence from Freedman, Shin, and Abrahamsen that the control of I.O.P. following trabeculectomy is not affected by suturing or non-suturing of the scleral flap. In other words, if one sutures the scleral flap well, the average drop of I.O.P. with the procedure is within the same range as when one does not suture the scleral flap at all. On the other hand, the relative number of complications post operatively without suturing the scleral flap becomes very much higher than when the scleral flapis sutured.

Trabeculectomy proved to be an effective method of controlling I.O.P. in eyes, suffering from primary glaucoma. Complications were few and follow up of 1 to 3 years suggested that late failure was rare. The procedure did not prove so useful in management of secondary glaucoma.
Watson concluded that trabeculectomy is a most satisfactory operation, satisfying the major rule of surgery, that operation.

1. Removes what probably is the diseased tissue and only the diseased tissue.

2. It is effective in controlling the disease.

3. The operation is at all times under the surgeons control with minimum of distortion of surrounding structure.

4. There have been no operative or post operative complications.

P.G. Watson and F. Banett performed a follow-up study of 90 eyes in 60 patient subjected to trabeculectomy showed that I.O.P. was controlled at the onset in 84% of the eyes and eventually controlled in 97% subconjunctival drainage were established by means of a bleb in 91%. Trabeculectomy produced a highly significant fall in 90% and a parallel rise in aqueous outflow facility. He suggested that trabeculectomy is free of major operative and post operative complication when used appropriately and it can be modified during the operation to deal with peripheral anterior synchia, when trabeculectomy is done, the surgeon is in control at all times and the procedure can be modified or stopped at any stage.

Probably the most significant advantage of trabeculectomy is the ability to control the depth of anterior chamber. It frequently remains throughout the operation and is almost well formed by the time the conjunctival sutures are passed.
Prof. Richardson felt tt trabeculectomy was most certainly a filtering procedure, these cases which did not filter, he assumed them to work as cycloodialysis. This operations had no broader spectrum of success than other filtering procedures but it has one real advantage i.e. the lack of immediate post operative flat anterior chamber. He also felt that if a trabeculectomy fails than the eye will not be significantly disturbed as far as the external anatomy is concerned.

The influence of fistulizing glaucoma operation in the physiology and morphology of the non-operative portion of the trabecular meshwork has not yet been sufficiently studied.

The clinical experience that I.O.P. and outflow resistance can rise after closure of a traumatic or surgical fistula may indicate that the trabecular meshwork gradually looses it’s normal function after fistulization of anterior chamber.

From time to time an eye is seen with normal pressure but no apparent external drainage. There is no angle closure also, there is no peripheral anterior synechiae, angle on gonioscopy is also widely open and the iris is flat without atrophy or spiralling. It seems possible that such an eye will be benefitted from a simple relief of trabecular obstruction and the aqueous humour will drain directly in sub-conjunctival space. In this new method of cairn the intention was to excise a short target of canal of schlemn with its trabecular adenexa thus leaving the two
cut ends, opening directly into sub-conjunctival space with no trabecular tissue remaining as a barrier at that part and thus restoring the integrity of corneo-scleral cut area.

He concluded that formation of bleb was the main complication and may have been due to failure to stitch back the corneo-scleral flap and Krasnov’s operation where the schlemm’s canal is externized. Stanford Smith J.H. (1978) compared the result of trabeculectomy, sclerotomy procedures is open angle glaucoma in African Negroes, trabeculectomy produced fewer long term complication but otherwise there was little difference in result. Excision of tenon’s capsule and the use of local cortico-steroids post operatively are probably significant in preventing failure of aqueous drainage from sub-conjunctival fibrosis.

1. Tenon was not excised.

2. Two flap were fashioned.

(A) Classical large Limbal flap.

(b) Semi-limbal forming a triangular flap.

Cases with the I.O.P. 20 mm of Hg. had a success rate of 95% a visual results were satisfactory bleb formation occurred by 3rd day, gonioscope showed no visible changes and there were no complications during operation.

Trabeculectomy has been made possible because of wide space and use of
The first report of glaucoma surgery of using a scleral lamellar flap to control filtration was by Sugar (1961) he termed it as “Experimental trabeculectomy according to him physiology of aqueous circulation indicates that trabeculectomy should be effective method of lowering I.O.P. in glaucoma, so he removed small segment of trabecular meshwork and presumably schlemm’s canal and carefully sutured the scleral flap to prevent excessive filtration but the results were poor.

In 1967 coryllos described an operative procedure for glaucoma in which he cut the trabeculum, this, too, did not achieve very good result.

Cairns (1968) subsequently reported good results with trabeculectomy and his basic operation with various modifications is at present the most popular surgical procedure for adult glaucoma. Cairn’s operation involves the dissection of an opening of A.C. under the scleral flap. The opening extends from the libus to the sclerspur but does not go behind it. At this level of dissection the tissue that is removed constitute-comea, trabeculum and scleral.

Soon after Cairns (1968) discription a major modification proposed by Watson (1969) in which subscleral flap dissssection was extended posteriorly behind the scleral spur.

Later on time to time different types of modifications of classical trabeculectomy came into light by different authors.
Keratectomy and trabeculectomy extending to the scleral spur and covered by half thickness scleral flap which is tightly sutured back into place is based on classical trabeculectomy procedure. This method has a great advantage of having very low risk of post operative complications. The other modification is to use fornix based, rather than limbal based conjunctival flap with a tightly sutured scleral flap suggested by Cairns and modified fornix based flap by Luntz.

A keratectomy and trabeculectomy extending to the scleral spur with the scleral flap remaining unsutred or loosely sutured. This operations, which is an open filtering procedure does not provide a good scleral barrier to free filtration as a tightly sutured flap does. Therefore, it has the same risk of major complications as the classical filtration operations, that is, a shallow or flat A.C. post operatively, P.O. hypotony and its sequelae cataract, maliganent glaucoma, in some eyes staphyloma may form at the side of procedure. According to Freedman, Sheh, Ahrens, there is no evidence that this method improves the surgical results in terms of controlling I.O.P.

In Watsons modifications subscleral flap dissections was extended posteriorly behind the scleral spur. In dissection of the deep cornea, trabeculum and sclera, the section was commenced posteriorly over the pars plana behind the scleral spur. The cilliary body was detached from the scleral spur by blunt dissection (in...
The "Watson" modification, therefore, constituted a keratotrabeculoclerectomy together with the internal cyclodialysis. This procedure is seldom used because of its high P.O.P. complications rate-particularly uveitis, and there is no evidence that it achieves better control of I.O.P. than does the Cairn's type of trabeculectomy.

A number of other modifications of trabeculectomy have been popularized. Although they may be preferred by surgeons, by various reasons, none have been proved more effective than any other. According to Becker-Shafer's (1983) (Diagnosis & therapy of glaucoma), a triangular one third of superficial scleral flap rather rectangular scleral flap is easier to dissect and reduces dissections thim and logically helps filtration more freely because sclerectomy opening is closer to the edges of scleral flap.

Different modification done with the conjunctival flap made in the trabeculectomy. Luntz, M.H. (1980) carried out trabeculectomy using a fornix-based conjunctival flap with tightly sutured scleral flap, (6. stitches). There was no button-holing of conjunctiva, inchaemia of bleb and no malignant glaucoma.

Shuster, J.N., Krupin, T.; Kalker, A.E., and Becker, B. (1984) studied the safety and success rate of Trabeculectomy using fornix-based or limbus-based conjunctival flap. Patient with phakic eyes and uncontrolled primary open-angle glaucoma had a trabeculectomy with either a standard limbus-based (19 eyes) or
fornix-based (19 eyes) conjunctival flap. Filtration surgery was equally successful (I.O.P. = 21 mm Hg.) in both groups. Four eyes in fornix-based group showed positive seidal test in the early post-operative period. Aqueous leakage was from the suture site at the lateral margins of the flap and resolved spontaneously without surgical intervention. The fornix-based conjunctival flap was easier to perform, provided better surgical exposure and was easier to close than limbus-based flap.

Carlo E. Traverso, Karim F. Tomey and Sobhi Antonios (1987) studied 20 patients with uncontrolled symmetric glaucoma who had undergone bilateral trabeculectomy after having received the same medical or laser treatment to both eyes. In each patient, the techniques and suture material used in the two eyes were identical and the surgeon was the same, the only variable being type of conjunctival flap, used. Patients were followed-up from three to thirteen months (median 8.5 months). There was no difference between the two groups in post-operative anterior-chamber depth, I.O.P. control, occurrence of hyphema size and shape of bleb, or the rate of complications. The fornix and limbal-based conjunctival flaps in trabeculectomy were found to yield comparable results in terms of safety and short-term efficacy of pressure control.

A.M. Khan and F.A. Jilani (1992), studied 100 cases of primary glaucomas, 50 cases were operated by making fornix-based flap and 50 cases were operated
by fashioning limbal based conjunctival flap. Operative and post-operative complication were studied thoroughly in the two groups. All the cases were followed up for six months to one year to assess the control of intraocular pressure, nature and functioning of filtering bleb, field changes and visual status in the two groups it was found that operative and post operative complications were minimum in fornix-based type as compared to limbus-based type. The fornix-based type took lesser time as compared to the limbus-based type.