REVIEW OF LITERATURE
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Glaucoma has affected the mankind ever since the emergence of mankind on the earth. But it was not recognised by the Classical and the Alexandrian Greeks as a specific disease and was considered as a part of cataract. The term GLAUCOMA (γλαυκόμα) was first used by Hippocrates in 420 B.C. to describe blindness coming on in advancing years associated with the glazed appearance of the pupil – “If the pupil becomes sea coloured the sight is destroyed and blindness of other eye often follows.”

The word glaucoma has usually been interpreted as implying a greenish or bluish hue, but it is more probable that to the Greeks it indicated no specific colour but the dull sheen or “glaze” of blindness. The term was used without any specific pathological connotations and represented no morbid entity, but probably included absolute glaucoma among other conditions. Glaucoma as we know today was vaguely classified as amblyopia, amaurosis, or gutta serena. Originally it was undifferentiated from cataract; both diseases were located in the lens, then considered the essential organ of vision, and both depended on a disturbance of visual sprits. Only at later date it was recognised by Celsus (25 B.C.- A.D. 50) and Rufos of Ephesus (95-117) and later by Glen (131-210) and other writers of early centuries that the morbid condition situated behind the pupil which gave rise to blindness could be differentiated in to two groups, “suffusions” or cataracts which were amenable to cataract treatment, and the glaucoma which were not. Michael
Brisseau (1709) of Paris for the first time showed that cataract was an opacification of the lens and disproving any lenticular abnormality in glaucoma by anatomical examination of the eyes of Bourdelot, the blind physician of Louis XIV.

The first suggestion of a disease associated with a rise in intraocular pressure and thus corresponding to what is known as glaucoma seems to occur in Arabian writings of At-Tabari (10th century) who wrote in the “Book of Hippocratic treatment” of chronic inflammatory conditions of eye with raised tension. The first original and clear recognition of such a condition in European writing is by Richards Bainster (1622), who in his book on Ophthalmology clearly differentiated between a curable cataract (gutta obscura) and glaucoma (gutta serena) wherein “the humour settled in the hollow nerves, be grown to any solid or hard substance, it is not possible to be cured”, and gave a tetrad of features: tension with long duration of disease, the absence of perception of light and the presence of fixed pupil. Antoine-Pierre Demours (1818) gave the first excellent description of Glaucoma with raised ocular tension; he noted and described for the first time the appearance of colours of rainbow around lights.

In Germany Karl Heinrich Weller (1826) wrote of the hardness of eye not only in established but also in the developing condition, and described two entities Arthritic ophthalmia without a greenish pupil and glaucoma wherein this was present. In London, G.J. Guthrie (1823) recognised hardness of the eye as characteristic of a disease which he called glaucoma.
With the introduction of the Ophthalmoscope, clinical observations on the glaucomatous cup begin to accumulate (Jacobson, 1853; Von Graefe, 1854-57; Weber, 1855; and others). These observations about cupping of optic disc were confirmed by the pathological researches of Heinrich Muller (1856). Von Graefe (1857) divided glaucoma on the basis of clinical picture in to three categories- acute, chronic and secondary, and the anomaly that Ophthalmoscope had lately revealed in the eyes with on signs of congestion as “amaurosis with excavation of the optic nerve”. The final important clinical observation was the unifying concept of Donders (1862), who recognised the last condition wherein an incapacitating increased tension occurred without any inflammatory symptoms as simple glaucoma.

Max Knies (1876) and Adolf Weber (1877) discovered that there is increase in frequency of obstruction of the angle of anterior chamber in glaucoma. Priestley Smith (1879-91) stressed faulty drainage rather than the theory of overproduction of fluid as the cause of glaucoma.

With the aid of early types of Gonioscope, Salzmann (1914-15), Troncoso (1925-35), Thorburn (1927) and Sigurd Werner (1932) pointed out that in some glaucomatous eyes the angle of anterior chamber was closed while in others it was open. Otto Barkan (1938) with an improved type of Gonioscope used with a contact lens divided glaucoma on one hand, with deep anterior chamber and an open angle, on the other hand, with a shallow
anterior chamber the drainage angle of which closed to produce a rise in tension.

The glaucoma is classically defined as a symptom complex in which the intraocular pressure of the eye is not compatible with the normal physiological functioning of the eye, with diurnal variation of more than 5mm Hg of intraocular pressure and is associated with visual field changes.

Von Graefe (1857) was first divided glaucoma on the basis of clinical picture in to three categories- acute, chronic and secondary, and the anomaly that Ophthalmoscope had lately revealed in the eyes with on signs of congestion as "amaurosis with excavation of the optic nerve". Donders (1862) recognised the last condition wherein an incapacitating increased tension occurred without any inflammatory symptoms as simple glaucoma. Thereafter it became generally accepted that two main types of disease existed, primary glaucoma occurring without other obvious diseases of eye, secondary glaucoma occurring as a result of other ocular diseases, as well as congenital glaucoma. For many years the standard classification of primary glaucoma embraced two categories: chronic simple and congestive; the later being divided in to two phases, acute and chronic. The ultimate stage of both is known as absolute glaucoma. Barkan (1938) established the concept of acute glaucoma as being anatomically determined by pupillary blockage and closure of drainage angle and suggested the terms wide-angle and narrow-angle, or subsequently, open-angle and close-angle glaucoma. Gradle (1924-46) divided closed angle type into four stages:
1. Pre- glaucoma: Here the angle is narrow, although allowing adequate drainage, potentially leads to attacks of raised tension or intermittent attacks.
2. Intermittent: Periodic transient attacks of raised tension which causes no organic or functional damage
3. Acute: Acute phase of raised tension
4. Chronic: Closed angle glaucoma wherein the drainage is permanently blocked by peripheral anterior synechiae.

Glaucoma was classified by in the International Symposium on Glaucoma in 1954 (Duke-Elder, 1955) into three types:
A) Primary Glaucoma – not due to obvious disease in the eye.
   1. Simple Glaucoma
   2. Closed Angle Glaucoma, which has four phases:
      - Pre- Glaucoma
      - Intermittent
      - Acute
      - Chronic

B) Secondary Glaucoma – due to pre-existing ocular disease; it may be either of open or closed angle type.
C) Congenital Glaucoma (Buphthalmos) due to obstruction of drainage by congenital anomalies.

The primary and secondary glaucoma are differentiated on the basis of presence or absence of the associated factors contributing to the pressure
rise. These primary and secondary glaucoma are further sub classified as open angle and angle closure type depending upon the status of the anterior chamber angle.

Cases exist wherein the typical changes at optic disc and defects in visual field occur, while there is no rise in intra ocular pressure and no diurnal variation of intra ocular pressure nor can be raised by provocative tests when account is taken of ocular rigidity. These cases have been termed low-tension glaucoma or pseudo-glaucoma by de Wecker (1896). These changes are usually due to ischemia of optic nerve caused by vascular insufficiency. By the middle of 20th century, the existence of low tension Glaucoma was firmly established and is now widely known as Normal Tension Glaucoma.

With emergence of normal tension glaucoma, the term glaucoma is now defined as a progressive Optic neuropathy which results from specific pathophysiological changes in the Retinal ganglion cell axons or Optic nerve fibres causing a characteristic structural changes in the Optic nerve head and the functional changes in the visual field which may or may not be associated with the rise in the intra ocular pressure.

Glaucoma accounts for 2% of blindness in India, out of which half are of open angle type. The elevation of the intra ocular pressure in open angle glaucoma is due to the obstruction of aqueous outflow caused mainly by the alteration in the trabecular meshwork. Other mechanism include collapse of Schlemm's canal, alteration in the intrascleral channels or influence of aqueous humour. This rise in the intra ocular pressure causes damage to the
Retinal ganglion cell axons or Optic nerve fibres and subsequently blindness.

Elevated intraocular pressure is the most treatable risk factor for glaucoma. The finding that the relative low intraocular pressure targets can slow or halt the progression of glaucoma is significant because the ultimate goal of glaucoma therapy is to minimize the visual loss it inflicts. Accordingly, the principal goal of glaucoma management is to reduce intraocular. Increasingly, this knowledge is leading to the setting of target pressure that is individualised to each patient as progression in glaucoma, often occurs at what are sought to be physiological pressures. The target pressure is determined by initial intraocular pressure level when the diagnosis was made, the degree of optic nerve damage, and the general health of the patient. The lower the initial intraocular pressure, the older the patient, the more advance the optic nerve damage, and the presence of cardiovascular disease or diabetes, the lower the target pressure must be set. This is most often achieved pharmacologically by decreasing the aqueous humor production and/or by increasing aqueous outflow; and can also be attained by various surgeries.

In olden days the medical treatment of simple glaucoma was confined to the chronic and absolute phase of the disease when the therapies consisted of bathing the eyes with vegetable derivatives. In second half of the 19th century almost simultaneously Adolf Weber (1876) advocated the use of the extract of Jaborandi (Pilocarpine) and Ludwig Lacquer (1876-77) of Calabar bean (Physostigmine, Esrine). By the middle of the 20th century, many
cholinergic drugs and cholinesterase inhibitors have been synthesized so that today the wide range of miotics have been introduced in to the pharmacological armamentarium.

Darier (1900) started the use of sympathomimetic drugs as an ocular hypertensive agent by treating the glaucoma patients with subconjunctival injections of epinephrine. Hamburger (1923-24) used epinephrine topically to reduce intraocular pressure. Sympatholytic drugs were introduced with the compound of Ergot by Thiel in 1924.

Cantonnet (1904) started osmotic therapy by administering sodium chloride by mouth, later by Hertel (1913-15) who gave intravenous injection of saline. This technique was followed by the use of more effective substances such as Sorbitol or Urea intravenously or glycerol by mouth. Becker (1945) used carbonic anhydrase inhibitors initially acetazolamide.

Phillips and co-workers (1976) reported that an intravenous injection of Propranolol, a β-adrenergic antagonist lowered intraocular pressure in humans. With in a short time Cote g. Drance SM (1968) & Ohrstrom A (1973) found that oral, and Bucci MG (1968) & Weinstein P found that topical Propranolol also reduced intraocular pressure. Later on Katz (1976), Vareilles (1977), Zimmerman and Kaufman (1977) established Timolol Maleate a β-adrenergic antagonist as an effective therapy for glaucoma. Additional topical β-adrenergic antagonist agents as Betaxolol, Levobunolol,
Metipranolol, Carteolol, and Timolol hemihydrate have been subsequently added to the armamentarium.

The experimental observations showed that topical prostaglandins produced first an increase, and later a profound decrease in intraocular pressure, and because of clinical observation that the intraocular inflammation was accompanied by low intraocular pressure (Starr MS, 1971), work begin to determine if one or more of the prostaglandins might be of value in glaucoma. Camras and Bito (1981) produced a reduction in intraocular pressure in monkey eyes lasting up to three days with use of relatively high topical dose of prostaglandin F2 (PGF2). The first usable prostaglandin was developed in Japan. Isopropyl Unoprostone (Rescula) is a prodrug that is derived from a pulmonary metabolite of PGF2 lowers intraocular pressure in dose dependent fashion with twice daily dosing, and is well tolerated (Takase M, 1992). Later on A. Alm (1993), Y. Hotehana (1993), S. Nagasubramanian (1993) established Latanoprost (PHX41) a PGF2 agonist as one of the most potent intraocular pressure lowering agent available today.

Very recently a new molecule known as Prostamide was discovered, which is derived from anandamide – a naturally occurring cell membrane lipid. In 1999 it was found to be potent and highly efficacious ocular hypotensive agent (Woodward DF, Krauss AH-P, Chen J – 2001; Brubaker RF, Schoeff EO, Nau CB – 2001). The intraocular lowering effect exerted by Prostamide is achieved by enhancement of aqueous humor outflow through both the
trabecular meshwork and uveoscleral routes. A synthetic Prostamide analog, Bimatoprost was synthesised that selectively mimics its ocular hypotensive effects and is used as a 0.03% ophthalmic solution to reduce intraocular pressure in patients with glaucoma or ocular hypertension.

Surgical procedures devised for the relief of glaucoma should ideally be such as to preserve the visual functions of the eye, maintain its tension within normal limits, and retain the integrity of the globe. The number of operations advocated from time to time is evidence that this ideal has not been attained till date.

First surgical procedure for glaucoma was suggested by William Mackenzie in 1830. He suggested Sclerotomy and Paracentesis as surgical treatment for chronic stage of glaucoma. A Paracentesis was a temporary expedient; the first to attempt to make it permanent was Gorge Critchett (1857), who in his operation of iridodesis, drew a piece of iris with a blunt hook into the wound made at the limbus for a Paracentesis, thus introducing the idea of drainage by an iris inclusion.

Albert Von Graefe (1857), observing the recession of staphyloma after an Iridectomy presumably owing to the relief of raised tension, announced the effect of a basal iridectomy in the treatment of acute glaucoma but, while the effect in this type of disease was acclaimed to be revolutionary and dramatic, equally good results were found to be absent in the more chronic forms
unless, the iris was incarcerated in the scar (Coccius, 1859-63; Baber, 1881; Parinaud, 1901).

Louis De Wecker (1868-71) devised anterior sclerotomy with a view to increase the drainage of aqueous by formation of a filtering cicatrices. In this procedure, after a puncture and counter puncture had been made just behind the limbus, the knife cuts in a short distance as in making an incision for cataract and then was slowly withdrawn leaving the upper pole of the limbus uncut. The operation was practised by Stellwag Von Carion (1870) and Quaglino (1871) and at a later date was improved by de Wecker (1894) himself by making a dialysis in addition and subsequently combining it with iridectomy (1901); but the results remained unsatisfactory for the wound tend to close even although the operation was followed by a prolonged massage (Dianoux, 1905).

Major H. Herbert of Bombay in 1903 devised Small Flat Sclerotomy. In which a small incision was made into the anterior chamber through the sclera behind and parallel to the limbus and at the either end two cuts were made perpendicular to the corneal margin thus leaving a rectangular trap-door of sclera with its base attached to the cornea. In the operation he deliberately induced a prolapse of iris protracted by a flap of conjunctiv in the scar. In a later suggestion, the wedge* resection of Herbert (1913), he isolated a wedge of sclera at the limbus attached to conjunctiva only so that it shrivelled, a technique further amplified by Cruise (1921-47).
Soren Holth (1907) popularised the iris inclusion in his technique known as iridencleisis. In this operation, under a conjunctival flap reflected to the limbus, anterior chamber is opened by a keratome which enters the sclera 2 mm behind the limbus and is directed towards the filtering angle. The scleral lip of the section is depressed so that the iris prolapses in the wound; this tissue is then cut in the 12 o’ clock meridian from the margin of pupil to its root; the nasal pillar is drawn outwards over the sclera; the temporal pillar is reposed; and the conjunctival flap sutured. Subsequent massage of the eye is usually considered necessary to ensure a continuous drainage because of the tendency to cicatrisation. L. and R. Weekers (1948) modified it by prolapsing the iris and then tearing it with iris forceps. Troutman (1954) demonstrated that the inclusion of two pillars of iris in the scleral wound was more effective than the one pillar, the former procedure being successful in 90% and later in 69% of cases. The main complications of this procedure were sympathetic ophthalmitis and late infections.

The production of a filtering scar by sclerectomy was another expedient adopted to secure drainage. This idea was first introduced by Douglas Argyll Robertson (1876) of Edinburgh in his technique of posterior trephining. He trephined at the junction of pars plana and ciliary body, reported 4 cases with reasonably satisfactory results. This idea of draining the suprachoroidal space was pursed by Freeland Fergus (1909-15), who improved upon it by introducing a spatula through the opening into the anterior chamber thus combining trephining with Cyclodialysis. Colonel Robert Henry Eliot (1902-32) of Madras revolutionised this idea by introducing corneo scleral
trephining at the limbus. Sclerostomy was further pursued by French surgeon, Felix Lagrange (1906-7), who finally achieved de Wrecker’s inspiration of establishing a filtering scar of permanent nature. Later the fashioning of similar type of drainage scar by cauterizing the sclera was sought by Count Luigi Preziosi (1924) and was further elaborated by Harold Scheie in 1958 who introduced cauterization of Sclera with peripheral iridotomy, known as thermal sclerostomy or Scheie Procedure.

Another type of operation depends on the establishment of drainage channels with in the eye. Such a procedure is done incidentally in other techniques and was first conceived by Leopold Heine (1905) as a primary operation in his technique of cycloidalysis. As with other filtering operations, attempts have been made to maintain the patency of cycloidalysis cleft by the introduction of foreign materials, initially by Row (1934).

With reasoning that Glaucoma was caused by a failure of the aqueous to reach Schlemm’s canal, Italian surgeon de Vincentiis (1893) conceived the idea of opening the canal by a knife introduced in to the anterior chamber known as trabeculotomy. His attempt was unsuccessful because he could not see where he was going. This feat was achieved by Otto Barkan (1936-38); he with an aid of contact glass and intense transilluminator devised a technique by which the canal can be cut open from within.
Synthetic devices or Setons are used in Glaucoma Surgery to maintain patent
drainage fistula. Rollet (1907) used Horse hair, Bock (1950) used Glass
tube, Qadeer (1954) used Acrylic Plates, Epstein (1959) and others used
Polythene tubes and Ellis (1960) used silicone tubes. In 1969 Molteno
established the idea of connecting a tube from anterior chamber to a
drainage field provided by an acrylic plate (Molteno, 1969-68). Later it was
modified by Schocket and Co-workers by shunting the aqueous via tube to
encircling band (1982-86). Then came the Ahmed valve which has a valve
feature that restricts flow of aqueous below 7mm of Hg, helping to minimize
postoperative hypotony. It is a single plate design that avoids multiquardant
surgery and involvement of extraocular muscles (Prata JA Jr and others,
1995). Clinical experience with Ahmed valve has produced pressure
lowering results that are similar to other implantation devices; postoperative
complications associated with over filtration appear to occur less frequently
with Ahmed valve implants than with most alternatives (Coleman AL and
others, 1995). Complications of drainage implants includes erosion of the
tube and plates, cataract formation, corneal decompensation caused by
endothelium-tube contact, hypotony with all its accompanying problem
(including suprachoroidal haemorrhage), and blockage of either end of the
tube by ocular contents in the anterior chamber or fibrosis at the bleb end.
Endophthalmitis and phthisis bulbi though rare, can be seen. So these
devices are not appropriate for initial surgery in uncomplicated primary open
angle glaucoma, but their risk is reasonable in more severe cases as
neovascular glaucoma, aphakic glaucoma, and advanced developmental
Various destructive procedures are also done on the ciliary body. Following the observation of Weve (1932) that extensive surface diathermy on ciliary body frequently resulted in ocular hypotension, Vogt (1936) proposed the operation of penetrating cyclodiathermy for various forms of glaucoma. Because of frequent postoperative complications, he modified his technique to partial penetrating cyclodiathermy (Vogt, 1937-39), while others have suggested that nonpenetrating is just as effective with fewer complications. Cyclodiathermy acts by reducing the formation of aqueous (R. Weekers and Prijot, 1952; Scheie et al., 1955) and on histological examination partial atrophy of ciliary body has been shown to occur in some cases (Scheie et al., 1955). Next came the cyclocryosurgery, in which the application of low temperature to the region of ciliary body also results in a reduction of ocular tension, and this form of cryosurgery is remarkably free from complications (Bietti, 1947-50; Krwawicz and Szware, 1965; de Roetth, 1966; Haye et al., 1967). With the advent of laser cyclophotocoagulation procedures came in to being, to destroy elements of the ciliary body. Cyclophotocoagulation tends to have fewer complications than dose cyclocryodestruction (Suzuki Y and others, 1991), but most glaucoma specialists do not attempt cyclophotocoagulation until other attempts at intraocular pressure reduction have failed.

Cairns in 1968 introduced modern day trabeculectomy. It was initially believed that the aqueous escapes through the cut ends of Schlemm’s canal but it subsequently became obvious that the major effect of the surgery
occurred through via filtration of aqueous through the subconjunctival space (Spencer 1972). This operation possibly avoided shallow or flat anterior chamber post operatively which was a major problem with unguarded filtering surgeries. Trabeculectomy has now become the standard glaucoma procedure, with excellent results for most forms of open angle and chronic angle closure glaucoma. Aphakic, inflammatory, traumatic, and other secondary forms of uncontrolled glaucoma also are treated with trabeculectomy; success rates are good when wound healing retardants or wound modulators as 5 Fluorouracil and Mitomycin-C were used in Trabeculectomy (Chen CW and others, 1990; Lamping KA, Belkin JK – 1995; Prata JA Jr. and others, 1995).

When the filtering Sclerostomy is protected from excessive flow either by partially closing it with scleral flap or by suturing techniques, it is described in terms such as guarded, protected sub-scleral, or partial thickness filtering surgery. The advantage of such techniques is that the initial egress of aqueous from the anterior chamber is retarded, which reduces the incidence of postoperative flat chambers (Wilson MR, 1989). This decrease in incidence of postoperative hypotony and flat chamber appears to reduce inflammation, peripheral anterior synechiae, and cataract formation as well. Guarded filtration procedures may also reduce the long term success rate of surgery and prevent attainment of the very low pressure that seems desirable in advanced glaucoma or normal tension glaucoma (Lamping KA and others, 1986).
Procedures such as thermal sclerostomy, posterior or anterior lip sclerectomy, or Elliott’s trephination has no guard over the external surface of sclerostomy other than conjunctiva and tenon’s capsule. These procedures are labelled as full thickness filtration surgery. Such procedures may be preferable if very low pressures are desirable as in normal tension glaucoma or if guarded filtering surgery has failed (Papst w. Brunke R, 1980).

External filtration surgery achieves reasonable intraocular pressure lowering in 65% to 85% of adults, depending upon the condition of the eye, the use of antimetabolites, the healing tendencies of the eye, and the skill with which the surgery is performed. This success rate may be increased to over 90% if eyes in which antiglaucoma medication use was resumed was included.

It is difficult to compare surgical results because of variation of techniques and definitions of success. In a prospective, randomised study of the difference between thermal sclerostomy and trabeculectomy, Blondeau and Phelps (1981) reported intraocular pressures less than 22 mm of Hg in 65% of thermal sclerostomies and 76% of trabeculectomies followed up for 5 years. When medications were added, the success rate rose to 91% of the eyes treated with thermal sclerostomy and 94% of those treated with trabeculectomy. Pressure tends to be somewhat lower in eyes undergoing thermal sclerostomy, but visually significant cataracts occurred three times more often and hypotony twice as often with thermal sclerostomy (Blondeau and Phelps, 1981). Thinner blebs were more frequent with thermal
sclerostomy. Even eyes with no detectable bleb at 5 years (approximately 1/3 of the total), however had intraocular pressures of 17 mm Hg.

In another retrospective study of comparison of full thickness filtration versus trabeculectomy, Lamping KA and others (1986) found that the former offered much better long term pressure control. They noted an equal frequency of problems with hypotony with guarded and full thickness procedures.

In various studies on eyes with open angle glaucoma, which were treated trabeculectomy, pressure level of 21 mm of Hg or lower with or without medication are achieved in 80% to 90% of eyes (Spaeth GL, 1980; Lewis RA, Phelps CD – 1984; Sharma SL, Singh T – 1981; Shields MB, 1980; Spaeth GL, Poryzees – 1981; Watkins PH Jr, Brubaker RF – 1978).

The experience with trabeculectomy with a scleral flap, with or without use of low concentration of antimetabolites and releasable sutures is quit good. But there are complications associated with it as:

2. Uveitis and Hyphema (Lundy DC – 1996; WuDunn D – 1997)
7. Cataract (Blondeau and Phelps, 1981)
8. Late complications such as failure of filtration, conjunctival scaring, over drainage of Filtering Bleb, spontaneous Hyphema, Ciliochoroidal detachment (Stamper RL, Liberman MF, Drakes MV – 1999).

Most of these complications occur due to conjunctival blebs and anterior chamber entry.

In last decade of 20th century a new approach to glaucoma surgery has evolved to minimize the complications just mentioned. Robert Stegmann of South Africa in 1996-1999 introduced a Non Penetrating Filtering operation known as VISCOCANALOSTOMY as a substitute for medical therapy for control of intraocular pressure as primary surgical procedure or in patients of primary open angle glaucoma who are on anti-glaucoma medication with uncontrolled intraocular pressure. Here the surgical complications due to conjunctival blebs and anterior chamber entry are almost eliminated.

Stegmann R, Pienaar A, Miller D (1999) performed viscocanalostomy in 214 eyes of black African patients with open angle glaucoma that was poorly controlled by medical therapy. They achieved postoperative intraocular pressure of 22 mm of Hg or less without any medical therapy in 82.7% of eyes. If beta blocker was added to the cases not achieving intraocular pressure of 22 mm of Hg or less postoperatively, the success rate increased to 89%. The average follow up was 35 months (range 6 to 64 months). They concluded that viscocanalostomy produced an encouraging
long term reduction in the intraocular pressure of black African patients with glaucoma who would otherwise have had a poor prognosis.

Dr G. Sunaric-Megevand reported an 86% success (20% with medications) for achieving pressures 20 mmHg in a mixed group of eyes undergoing viscocanalostomy.

C. Lüke, T. S. Dietlein, P. C. Jacobi, W. Konen and G. K. Krieglstein in their study to assess the efficacy and postoperative complications of viscocanalostomy versus trabeculectomy selected forty eyes of forty patients with medically uncontrolled open-angle glaucoma were randomized either to the viscocanalostomy or to the trabeculectomy group of the trial. The mean preoperative intraocular pressure (IOP) was 26.7 (SD 6.3) mmHg for all patients enrolled. The mean postoperative IOP was 10.5 (SD 6.60) for the trabeculectomy group and 17.1 (SD 7.0) for the viscocanalostomy group, respectively. The postoperative IOP-difference between the two groups was statistically significant (p = 0.007). The success rate, defined as an IOP lower than 21 mmHg without medication, was 60 % in the trabeculectomy group and 15 % in the viscocanalostomy group at 12 months postoperatively (p = 0.004). The number of postoperative complications was lower in the viscocanalostomy group. They concluded that in eyes with open angle glaucoma, viscocanalostomy is less effective in reducing postoperative IOP than the standard filtering procedure. However, the risk profile appears to be more favorable in the eyes treated with Viscocanalostomy.
D.P.S. O'Brien, E. Rowlands, N. Islam at St. Thomas' Hospital, London compared trabeculectomy with viscocanalostomy for the control of intraocular pressure (IOP) in open angle glaucoma (OAG) uncontrolled by medical therapy. 48 patients (50 eyes) were randomised to trabeculectomy (25 eyes) or viscocanalostomy (25 eyes). Those undergoing trabeculectomy were given intraoperative antimetabolites (5-Fluorouracil 25mg/ml (5-FU), Mitomycin-C (MMC) 0.2gm/ml and 0.4mg/ml) according to a protocol. Antimetabolites were not used in eyes undergoing viscocanalostomy, but were randomised to the use of viscoelastic (Healonid GV) for intra-operative intracanalicular injection. There were no differences between the groups in age, sex, type of OAG, preoperative medications, risk factors for drainage failure and preoperative IOP. Mean follow up was 19 months (range 6-24 months). It was 12 months or longer in all eyes, except one. At 12 months, complete success (IOP >21mmHg without anti glaucoma medications) was seen in all eyes undergoing trabeculectomy (100%) but in only 64% of eyes undergoing viscocanalostomy (p>0.001). The mean IOP at 12 months was lower in eyes that had undergone viscocanalostomy using intra-operative intracanalicular Healonid GV injection compared to those where only balanced saline solution had been used (p>0.01). In terms of complete success there was no difference between the viscocanalostomy groups (p>0.1). With the exception of measurements at one week, visual recovery (log MAR acuity) was similar and laser flare and cell values showed little differences between the groups. Early bleb leaks and hyphema (p>0.05), as well as cataract formation were more common after trabeculectomy
(p>0.05). They concluded that IOP control is better with trabeculectomy. Viscocanalostomy is associated with fewer post-operative complications, although significant complications permanently impairing vision did not occur with either technique.

Carassa RG, Bettin P, Fiori M, Brancato R (1999) performed viscocanalostomy in 33 eyes of 33 patients of glaucoma, uncontrolled despite maximum medical therapy. In 4 eyes Schlemm's canal was either missed or not deroofed properly. After a mean follow up of 3.0 +/- 2.6 months (range 1 – 10 months), success defined as intraocular pressure >2 and <21 mm of Hg with no medication was obtained in 86.2% of cases (25/29). They concluded that Viscocanalostomy in short term study proved safe and effective in lowering intraocular pressure in glaucomatous eyes.

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