History of the Development of Cataract Surgery

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Cataract is the most common cause of curable blindness in India. Our current knowledge of the disease indicates that there is no effective medicinal treatment; the only curative treatment for cataract being surgery.

Many years ago, surgery was performed only when a patient suffered from a matured cataract. Good vision is an increasingly important aspect of patients lives, however, and is particularly crucial to most occupations. Today, an individual's needs rather than the degree of maturity of the cataract, dictates when surgery is indicated.

The first surgical procedure for cataract was couching, or displacement of the lens into the vitreous cavity. This technique was introduced by Susruta, the sclera was pierced with a sharp instrument and a blunt instrument was inserted into the anterior chamber to depress the lens.

In 1748 a British surgeon, Laques David, performed an extracapsular cataract extraction (ECCE). This method involved removal of the cortex, nucleus, and the anterior capsule of the lens, but preservation of the posterior capsule, which remained inside the eye.

During this period, suture material was not available, so the incision was left unstitched. Patients were advised to remain in bed after surgery, and to keep the eye bandaged for several days. Minimal straining would cause dehiscence of the surgical wound, prolapse of the internal structure of the eye and infection. Since the procedure was so delicate, many patients lost their sight.

In 1867 Dr. Williams was the first surgeon to use sutures in cataract surgery. Eye surgeons around the world followed his example of using sutures to close the surgical wound. Since then this became standard practice.

In 1753 Dr. Samuel performed intracapsular cataract extraction surgery by applying pressure to the eyeball with his thumb. Colonel Henry Smith popularised this technique, practicing it on many patients in India from 1900 to 1926.

Intracapsular extraction is performed on patients over 50 years of age. In this method, first a conjunctival partial thickness incision is made in the upper part of the corneal-scleral junction, followed by a stab entry with a blase blade into the anterior chamber. The incision is completed with corneal scissors, and a peripheral iridectomy is performed to prevent aphakic glaucoma.

Intracapsular cataract extraction has been modernised by several methods

1. Capsule - holding forceps
2. Erisophake

} To hold the anterior capsule to remove the lens.

3. Modified Smith - Indian technique: using a hook and a spatula to remove the lens.
4. Cryo extraction: This procedure is performed with a cryogenic (cryo) probe from a cryo unit. The cryo probe is manipulated according to the joule thomson principle of cooling. The gas used as a cooling agent in the cryo unit is nitrous oxide or carbon dioxide. The cryo probe is 1.5mm in length and may be straight or curved. The temperature produced depends upon the size of the cryo tip, the duration of the freezing process and the type of gas used. When the foot pedal of the cryo instrument is depressed, the pressure decreases, causing gas to filter through a small opening in the cryo probe. This process results in cooling to 4 ^{o}C and the formation of a ball of ice on the capsule. Finally, the cataractous lens is removed and the wound is closed with fine sutures.

Cryo extraction is more popular than other methods of intracapsular extraction.

Extracapsular cataract extraction

The initial step of this surgical procedure is identical to that of the intracapsular cataract surgery. After making the stab entry into the anterior chamber of the eye, an anterior capsulotomy is performed on the lens. When the incision has been completed, the

nucleus is removed (using an instrument called vectis) and the cortex is aspirated with a simcoe cannula. The incision is closed with sutures.

Harold Ridley modernised this technique in 1949 by implanting an intraocular lens after extracting the cataractous one.

Ridley was inspired during the second world war when he realised that fragments of canopy (a material that covered British fighters flight) which had fallen into a pilot's eye did not produce an adverse reaction. The canopy was made of a plastic material known as polymethyl methacrylate. Ridley had an intraocular lens made of this material. On November 29, 1949 he became the first person to implant such a device.

Since then, the intraocular lens has undergone several modifications. The initial lens was placed in the anterior chamber, between the iris and the cornea, and supported by the iris. Since many complications arise from this placement, surgeons began placing the lens in the posterior chamber. Fewer complications were seen with posterior chamber lenses; they are commonly used today. Ninety-nine percent of cataract surgeries now involve intraocular lens implantation.

SISCS - Small Incision Sutureless Cataract Surgery

This method involves making a tunnel incision, about 5mm in length, in the superior side of sclera and performing paracentesis 3mm from the tunnel. After capsulorhexis on the lens and hydrodissection, the nucleus is flipped within the anterior chamber and removed with a vectis. The cortex is then aspirated with a simcoe cannula. An intraocular lens is placed in the bag.

This procedure replaces the phacoemulsification technique because it results in the same visual rehabilitation.

The most recent development in intraocular implant surgery is a "sutureless" technique using phacoemulsification, which was introduced by Dr. Kelman in 1967. The sophisticated instrument used in this surgery allows the cataractous lens to be removed through a very small (3.2mm), bevelled incision. A foldable intraocular lens is then inserted through the incision. By extending the tunnel to a width of 5mm, a routine single-piece lens may also be implanted. In most cases this incision does not require sutures, and the post operative rehabilitation period is short.

In 1960 Harold Scheic introduced a cataract aspiration system for use in patients with immature, congenital or traumatic cataracts.

Treatment modalities for children

1. Lensectomy: An incision 3 to 4mm in length is made in the sclera, 3.5mm from the limbus. An opening is made in the capsule and cortex with a knife, and an instrument called a vitrectomy lensectomy probe is used to aspirate the lens matter. Following this surgery contact lenses or glasses are prescribed to correct the refractive error.
2. Lens aspiration: A small incision is made in the corneo-scleral junction, after which an anterior capsulotomy is performed and the cortex of the lens is aspirated.
3. Extracapsular cataract extraction (ECCE) and IOL implantation: This procedure is performed in children over three years of age

Suggested readings

1. Gupta, A.K, Cataract: 32-47.