

A SLEEVE FOR A PHACOEMULSIFICATION NEEDLE

Small incision cataract surgery, to replace a cataract (the clouding and yellowing of the lens of the eye) has been known for many years. In such surgery, the cataract is removed and replaced with an intraocular lens. A preferred method of performing such surgery is to make a tunnel incision into the eye through which the cataract is removed and a foldable lens implanted. The most modern method of removing a cataract is by phacoemulsification. A phacoemulsifier is an ultrasonic probe which vibrates 40,000 times per second and breaks up a cataract into tiny microscopic pieces which are emulsified in a saline stream and gently aspirated out of the eye. Eighty-five percent (85%) of all cataract surgery in the USA and fifty percent (50%) in Europe is performed using the phacoemulsification method.

A conventional phacoemulsification tool is illustrated in Figure 1 and this comprises a hand-held tool body 10 which includes an ultrasound source, the ultrasound source being connected via a connector 12 to a phaco needle 20 which is screwed into the connector 12. The needle 20 is hollow and connects with a coaxial bore 13 in the connector 12 which in turn connects to a peristaltic pump (not shown). The connector 12 further includes a plurality of openings 14 radially spaced around the connection socket for the needle 20, for supplying a flow of saline to the needle surface. This flow of saline is conducted to the tip of the needle by a sleeve 30 which is passed over the needle 20 and secured to connector 12. The portion 32 of the sleeve is sufficiently wide to form an annular region between the inside of the sleeve and the outer surface and the needle, through which the saline can flow.

In use, the needle 20 with sleeve 30 is inserted into the eye and the ultrasonic source in

body 10 vibrates the needle 20 so that the needle breaks up the cataract into tiny microscopic pieces. These pieces are then emulsified with the saline and gently aspirated out of the eye through the needle 20. Since the needle vibrates from the ultrasonic energy, there is a build up of heat from friction between the sleeve and the needle, as well as from the vibration. The flow of saline over the needle surface thus also cools the needle and conducts the heat away.

One limit on reducing wound size in the phacoemulsification technique is that sleeve has to allow free flow of fluid and the wound cannot be so tight, therefore, to pinch the sleeve and strangle the flow of saline to the eye which would result in thermal burns and consequent damage to the wound site.

In order to reduce the wound size, a needle has been proposed termed "MicroFlow" which has a plurality of longitudinal grooves through which the saline solution may flow. With this proposal, the sleeve can be a tight fit on to the needle, thus reducing wound size. It is a disadvantage of this proposal, however, that the grooves need to be formed with precision and thus the needle is significantly more expensive to manufacture than conventional phaco needles.

It is an object of the invention to provide phacoemulsification apparatus that maintains a reduced wound size relative to the convention phacoemulsification apparatus but is less expensive to manufacture than the MicroFlow needle system.

According to the invention there is provided a sleeve for receiving a phacoemulsification needle, the sleeve having a plurality of internally protruding elements for engaging a said

needle, a path being defined between the elements for flow of liquid through the sleeve.

Preferably, the elements are formed as longitudinal ridges or spaced ribs, projections or pillars, the liquid flowing between the ridges or through the gaps between the pillars.

According to the invention in the second aspect there is provided a sleeve for receiving a phacoemulsification needle, the sleeve having at least one internally projecting helical element for engaging a said needle, the or each element defining a helical path for flow of liquid through the sleeve.

An embodiment of the invention will now be described, by way of example, with reference to the accompanying drawings in which:

Figure 1 is a schematic view of phacoemulsification apparatus of the prior art.

Figure 2 is a side view of a phacoemulsification sleeve being an embodiment of the invention.

Figure 3 is a view in the direction of arrow A of Figure 2 ; and

Figure 4 is a cross sectional view in the plane B-B of Figure 2.

With reference to Figures 2 - 4 a sleeve being an embodiment of the invention is shown.

The sleeve is constructed in a similar way to a conventional sleeve for a phacoemulsification needle in that it is formed from elastomeric material such as silicone rubber in a single moulded piece. The sleeve is of generally cylindrically hollow form and includes a portion of wider section 110 for receiving the connector 12 of the phacoemulsification tool body 10. The inner surface of the section 110 may be threaded to

receive the connector. A relatively narrow elongate section 120 of the sleeve receives a prior art phaco needle 20. Two circular openings 122 are provided adjacent the free end of the section 120.

With reference particularly to Figure 4, the section 120 of the sleeve has an internally ridged structure comprising a plurality of longitudinally extending ridges 140 which form channels 142 therebetween. In use, when the needle 20 is inserted into the sleeve, the tips 144 of the ridges engage the needle, with the saline solution been able to flow from the openings 14 in the connector 12 of the tool body 10 to the tip of the needle 20 through channels 142 and openings 122.

The provision of the ridges 140 provides the necessary support to maintain channels 142 to allow saline flow while allowing a reduction in diameter of the sleeve relative to the prior art shown in Figure 1, so reducing wound size. The sleeve has the advantage that since it is formed by moulding, production is relatively inexpensive.

Instead of providing a plurality of longitudinal ridges as shown in Figure 4, other internally projecting element(s) may be used e.g. spaced ribs, projections or pillars or one (or several, parallel) helical projecting element(s) defining a helical groove for flow of saline through the sleeve.

Claims

1. A sleeve for receiving a phacoemulsification needle, the sleeve having a plurality of internally projecting elements for engaging a said needle, at least one path being defined between the elements for flow of liquid through the sleeve.
2. A sleeve as claimed in Claim 1 wherein the elements are longitudinal ridges.
3. A sleeve as claimed in Claim 1 wherein the elements are spaced ribs, projections or pillars.
4. A sleeve for receiving a phacoemulsification needle, the sleeve having at least one internally projecting helical element for engaging a said needle, the or each element defining a helical path for flow of liquid through the sleeve.
5. A sleeve as claimed in any one of the preceding claims formed from elastomeric material.
6. A sleeve as claimed in Claim 5 wherein the elastomeric material is silicone rubber.
7. In combination, a sleeve as claimed in any one of the preceding claims and a phacoemulsification needle.

