

rotated clockwise 90°, three way valve 62 is rotated counter clockwise 90° and pressure control solenoid 44 is activated by heel depression of foot pedal 52 to pump cleaning solution through the interconnecting conduits, including conduit 28, downstream of the cleaning solution and into lens capsule 22 from which the excess fluid vents through the vent needle. Three way valve 58 is then returned to the position of FIG. 2, three way valve 62 is rotated 90° clockwise from the position of FIG. 2 and suction is applied by activation of solenoid 42 to draw cleaning solution through those conduit connections not cleaned during the initial flushing of lens capsule 22. All of the three way valves are then positioned as in FIG. 2 and solenoid 44 is activated to pump sterile gas through the main line conduits interconnecting pump manifold 50 and the instrument connected conduit 28. This gas pressure provides an additional flushing action for the lens capsule as the remaining cleaning fluid in the conduits downstream of the cleaning solution is forced through the lens capsule and out the vent or bleed needle. The pressurization with sterile gas is continued until the lens capsule 22 is dry and sterile.

Three way valve 60 is then rotated clockwise 90° from the position of FIG. 2 and three way valve 64 is rotated 90° counter clockwise from the FIG. 2 position. Solenoid 44 is then activated to pump lens filler material 36 into the lens capsule as indicated in FIG. 17. Following the expansion of lens capsule 22 with a desired volume of filler material, such as silicone for example, accompanied by a bleed of any excess material through the bleed needle; both needles are withdrawn, the wounds are self-closing and the operation is complete.

Although a hollow needle has been described as one means of affording instrument entry into a body in connection with cataract surgery where multiple connections to the hollow member are required, it is apparent that in simpler surgical procedures the needle could be dispensed with and instrument entry effected directly with a hollow drill. Thus, in removing a small blood clot, for example, penetration could be effected by augering as already described with a hollow, spiral fluted drill 150 (FIG. 18) chucked in collet 128 and needle adapter 112 removed from instrument body 68. The drill would next be unchucked from the instrument body as by unscrewing adapter 108 to gain access to collet 128. A tool similar to the masticating tool 132 could then be run down the drill bore 152 to reach the interior operative location. If the surgeon merely wished to grasp the small clot and withdraw the same through the hollow drill (it being understood that the drill dimensions are selected to accommodate the size clot anticipated) it would be unnecessary to chuck the grasping tool since it could be manually manipulated to spread the prongs and then contract the same to grip the clot by withdrawal of the gripping tool into the hollow drill bore. Similarly, the masticating tool could be chucked for rotation, and the clot masticated and withdrawn generally in the manner described for cataract surgery.

Additionally, the hollow drill 150 may be advantageously used for substantially any function presently performed by a hypodermic needle such as withdrawing blood or other body fluids and in the administration of simple injections. Exemplary of the foregoing is the frequently experienced difficulty of blood withdrawal from a small veined person; the small vein tending to

move away from or be deflected by the needle point. In such cases it is not unusual to do several needle punctures before the vein is penetrated. The augering effect of the drill minimizes this tendency for the vein to deflect as the spiral flutes come into biting contact with the vein almost simultaneously with initial contact. Once the vein is penetrated, the instrument body may be detached and a withdrawal syringe connected to the in place hollow drill which then performs the function of a hollow needle. More desirably, however, the instrument body would be fitted with a self contained syringe.

When using the hollow drill 150 it will normally be desirable to reverse the rotational direction of the drill to facilitate withdrawal.

I claim:

1. A method of removing cataracts, comprising; migrating a hollow needle into an organic eye and into the interior of the crystalline lens capsule containing a cataract; inserting a contractible and expansible masticating tool into said hollow needle in the contracted condition thereof; advancing the contracted masticating tool to the open end of the hollow needle in the interior of the crystalline lens capsule; advancing the masticating tool beyond the open end of the hollow needle and expanding the same within the crystalline lens capsule into masticating contact with the lens contents; rotating the expanded masticating tool and masticating the entire contents of the lens capsule including the cortex, nucleus and cataract while maintaining the structural integrity of the lens capsule; and withdrawing the masticated material through said hollow needle.

2. A method of cataract surgery, comprising; inserting an augering tool through the bore of a hollow needle; rotating said augering tool and extending the same from one end of the needle; infeeding the needle and augering tool into an organic eye and into the interior of the crystalline lens capsule containing a cataract; retaining said needle in place within the eye and removing the said augering tool; inserting a contractible and expansible masticating tool into said hollow needle in the contracted condition thereof; advancing the contracted masticating tool to the open end of the hollow needle in the interior of the crystalline lens capsule; advancing the masticating tool beyond the open end of the hollow needle and expanding the same within the crystalline lens capsule into contact with the interior contents of the crystalline lens capsule; rotating the expanded masticating tool to masticate the lens capsule contents; retaining said needle in place and withdrawing said masticating tool; infeeding a second needle and augering tool into said eye and into said lens capsule; retaining said second needle in place and withdrawing said second augering tool; and withdrawing the masticated contents of said lens capsule through one of said hollow needles.

3. The method of claim 2 including the additional step of replacing the volume of the withdrawn lens contents through one of said hollow needles.

4. A method of removing cataracts, comprising; migrating a hollow needle into an organic eye and into the interior of the crystalline lens capsule containing a cataract; the step of migrating said hollow needle including rotating a rotary augering tool within said hollow needle and concomitantly advancing said rotary augering tool and hollow needle into said eye with said rotary augering tool in advance of said hollow needle; withdrawing said rotary augering tool from said needle