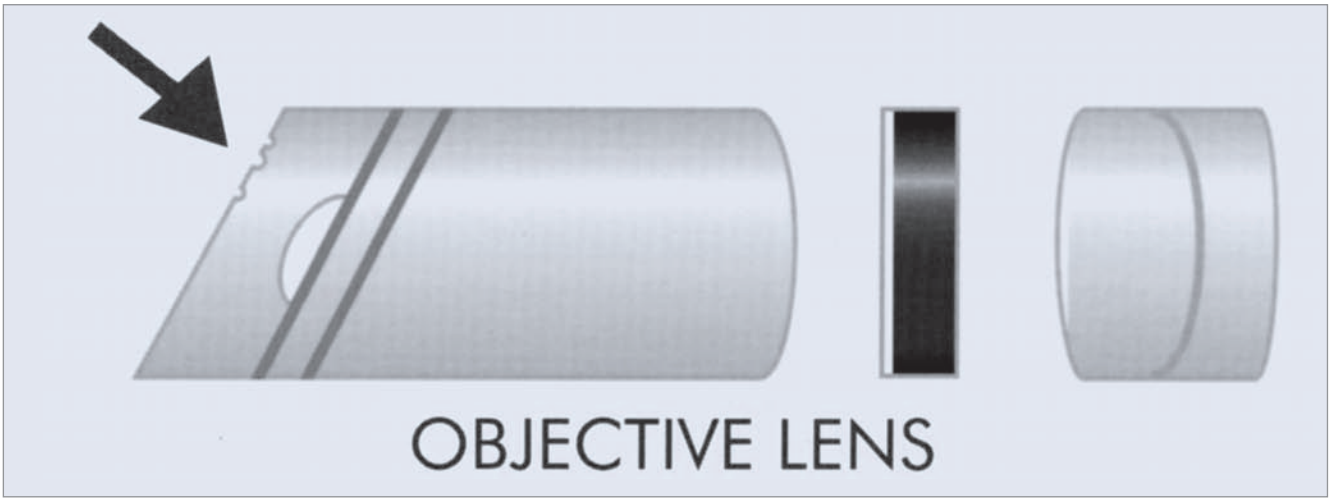
FIBERTECH MEDICAL, U.S.A.

Shop Talk

Rigid Scopes and Associated Problems



Knowing more about a problem may lead to its prevention.

1. BROKEN ROD LENS

The most common repair on a rigid scope is the replacement of damaged rod lenses. Rods of flint or crown glass have replaced the previous trains of field lenses, resulting in a design which increases light transmission by minimizing air spaces. A typical rod lens is 1.0 to 6.0 mm in diameter and between 5.0 and 50.0 mm long. There are many lens configurations but a common format is to adhere a couplet on one end and a singlet on the other end of the rod. Pairs of these lenses separated by a spacer transfer the image the length of the pair, successive pairs transfer the image the length of the scope where it is magnified by the ocular and viewed.

The great advantage of the rod lens over a fiber image is the increase in resolution, making it ideal for surgery. The disadvantage is the rod lens is prone to breakage, occurring from impact or flexing of the tube. A broken rod lens may appear as a darkening or clouding of the image, as if looking through broken glass, or by having no image at all. To reduce breakage, certain model scopes are spring loaded to absorb shock and others have hour glass shaped lenses to reduce tube contact and allow for flex.

2. DAMAGED OBJECTIVE

The lens train terminates at the distal tip with the negative lens which determines the field of view of the scope. It may be the last element or it may be protected with a plano (flat) window. In either case, these elements are very thin and can be damaged easily. Caution should be taken not to contact the window surface because these elements are among the most expensive and also have the most effect on the image.

3. DUST IN THE IMAGE

During manufacture and repair all components of the scope are cleaned and vacuumed, but dust can still appear. The rod lenses, spacers, field lens and the inner wall of the tube abrade during use creating the minute particles which appear as dust when magnified by the scope.

4. FLUID INVASION

The most common avenue of fluid invasion is through the break down of adhesive bonds due to repeated heating and cooling of the scope during reprocessing. Broken windows in the eyepiece or the distal tip and inadequate O-ring seals are other sources of moisture. Typical symptoms include: foggy or dark image caused by fluid residue, the loosening of cemented lenses, deterioration of anti-reflective coatings or mirrored surfaces.