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The new surgery

Surgeons applaud large incisions and denigrate "keyhole surgery." Patients, in contrast, want the smallest wound possible, and we at Britain's first department of minimally invasive surgery are convinced that patients are right. What makes patients ill after an operation is the iatrogenic damage that surgeons have inflicted in achieving their technical aim. For instance, a patient who has had a renal stone removed by open surgery is incapacitated for weeks by the trauma needed to reach the stone; if the stone is removed either by percutaneous nephrolithotomy, which requires cutting through only a few tissues, or extracorporeal shock wave lithotripsy, which is entirely non-invasive, then the patient can return to normal life within hours. In the years to come we will see similar techniques developed for all sorts of surgery.

In urology substituting the notorious open lateral lithotomy for removing bladder stones by closed instrumental urethral lithotrity reduced the operative mortality from 40% to 1%. Urologists have also replaced the blood bath of open prostatectomy by the far safer transurethral resection. Within the past six years stones in the kidney, an organ that is difficult to get at, have come to be treated by percutaneous nephrolitomy and extracorporeal shockwave lithotripsy; now the techniques have been combined to treat well over 95% of cases of unselected renal calculi without resource to any open access surgery. The interior of the ureter has also been made accessible by the ureterorenoscope, which can be used to remove stones and tumours; and obstruction of the pelviureteric junction can be dealt with endoscopically, rendering the operation of open pyeloplasty obsolete. Many urethral strictures can also be treated endoscopically.

In gastroenterology the percutaneous removal of gall stones is being undertaken both transhepatically with flexible endoscopes and transperitoneally with solid rod nephroscopes and ancillary instrumentation. Endoscopic cholecystectomy is a short step away, and an extracorporeal lithotripter is undergoing clinical trials. Endoscopic appendicectomy has been successfully performed in Germany, and medical gastroscopists and colonoscopists are rapidly relieving the surgeons of the responsibility of treating ulcers and polyps. (It seems extraordinary that general surgeons have not yet seized on the operative potential of the laparoscope.) Endoscopic techniques are particularly valuable for the previously inaccessible oesophagus and both benign and malignant strictures may be dilated or divided under minimal anaesthesia. Bleeding oesophageal varices may be sclerosed by injection, and bleeding vessels in ulcers can be coagulated. The patient may then be treated conservatively with H_2 receptor antagonists rather than by the mutilating surgery of gastrectomy. An endoscopic bowel resection is feasible and should soon be achieved. Indirect inguinal hernias may be repaired laparoscopically through a small abdominal puncture: the neck of the sac can be identified at the internal ring and the sac inverted by suction or traction and then ligated.

Vascular surgeons have long been doing endoscopic endarterectomies. Now the 200 μm laser fibre allows vaporisation of arterial plaque under direct vision in small arteries. Coronary artery obstruction has begun to be treated by such a technique, and open coronary bypass surgery will become a historical curiosity.

Orthopaedic surgeons have reduced the trauma and morbidity of intra-articular operations with arthroscopy of the knee, and the shoulder, elbow, ankle, wrist, and hand joints have now become accessible to endoscopic treatment. Soon orthopods will gain access to the hip, and reparative operations will be carried out. Chest surgeons have used bronchoscopy for many years and are now using lasers to cure bronchial tumours. Lasers are also being used down the bronchoscope to cut through obstructive tumour lesions and to clear the bronchi and to secure a palliative airway; this could not be done with open surgery.

Neurosurgeons are using endoscopes to examine the ventricular cavities and computer guided lasers to ablate cerebral tumours, and a microendoscopic approach for treating prolapsed intravertebral discs seems likely in the next ten years. Ear, nose, and throat surgeons have mastered operations of the middle ear and even the inner ear with the operating microscope, thereby avoiding the mutilating transmastoid approach. The larynx has also become accessible to detailed endoscopic examination, and microlaryngeal surgery can be carried out under magnification. The nose and paranasal sinuses are accessible to direct examination, and limited operations can be carried out within the sinuses.

Gynaecologists were some of the first to adopt endoscopic

techniques and have achieved much through the laparoscope. Now colposcopy with laser assistance is changing the management of early cervical cancer. Over the next 20 years surgeons will increasingly use physical modalities such as ultrasound and the laser, particularly for tissue ablation. They will break up and remove benign and malignant tumours, coagulate bleeding vessels, and disintegrate tissues and even whole organs (such as the gall bladder). These ablative techniques depend on delivering intense disintegratory energy precisely in a controlled manner. Having destroyed and ablated the tissue, the surgeon needs some method of aspirating the debris. The ultrasonic Cavitron seems to be the first step in this direction, and it is already being used extensively for ablating solid tumours at open surgery. In the next five years we shall almost certainly see similar instruments developed for endoscopic use.

The history of surgery may now be divided into three phases. From ancient times until the mid-nineteenth century surgery was rough, rapid, brutal, ablative, and had only limited applications. In the second phase, which lasted until about 1960, anaesthesia and improved resuscitation techniques allowed complicated procedures to be carried with only minimal thought being given to the effects on the patient: many deaths and much illness were caused by the activities of the surgeon rather than the disease. Since 1960 some surgeons have realised that operations could be performed more elegantly and less traumatically with advanced instruments, particularly endoscopes.

In the next 30 years immunologists and chemotherapists may take over the treatment of cancer, while interventional radiologists and surgeons who practise minimum invasion will do most non-emergency surgery. Open operations will remain only for trauma and reconstruction. This means that surgeons will need to be trained as microendoscopists and bioengineers rather than as butchers and carpenters.

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Retreat from openness

In a "closed society," writes Popper, "there must be a censorship of all intellectual activities of the ruling class, and a continual propaganda aiming at moulding and unifying their minds. All innovation in education, legislation and religion must be prevented or suppressed."[1] These are words that we might turn over in our minds when we consider the recent changes in the ruling on publication in the contracts of researchers funded by the Department of Health and Social Security; many of them interpret the changes as attempts at censorship of intellectual activities. In other parts of the health service as well doctors and others are to be heard bemoaning constraints on the free and informed discussion of health issues, and on p 1633 there is a list of recent examples. Are we in the health service in Britain entering a more closed society?

The world has never lacked for examples of such societies: Pericles could point to Sparta; Commonwealth censorship provoked Milton to write *Aeropagitica*, with its moving picture of Galileo "grown old a prisoner to the Inquisition for thinking in astronomy otherwise than the Franciscan and Dominican licensers thought"; and our own century has seen Hitler's Germany and Stalin's Russia. There has probably never been—perhaps, indeed, there never can be—a completely open society. The state must have its secrets, and commercial firms are not likely to share valuable information with their competitors. But it is surely a sign of a good society that secrecy is kept to a minimum, and mercy should temper justice when secrets are broken on grounds of conscience. This is not to excuse an oath breaking self styled spycatcher; but on a recent visit to Australia I became aware how much his Wildean pursuit by Sir Robert Armstrong had added to the gaiety of that nation and how little it had done for Britain. Even if the United States has a Freedom of Information Act and Britain has a Data Protection Act, I suspect that the balance between state and commercial secrecy and the investigative media is much the same in both countries.

Whatever legitimate constraints there may be on openness in government or in commerce, there should surely be few or none in our universities or in non-commercial civil research, including that related to the health services. Britain has a strong tradition of independence both in scholarship and in research, and I do not suggest that the vandals are at the gates. But there are worrying trends, and the time to draw attention to them is before they become rooted and established.

It may be paranoid to see anything sinister in the stereotyping of school education in a core curriculum, but it could be seen as preparing future students for a similar reduction of available options at the university. Again, we can have no absolute criticism of the drive towards closer links between the universities and industry, with some of the finance coming from industry. But in so far as this is caused by financial pressures on the universities through a shortfall of government funding, it is a sad thing—and also an encroachment on what should be the independence of universities. The growth spurt in biotechnology after the dramatic developments in molecular biology has perhaps gone further in the US than in Britain, and an article in *Science* has analysed the "effects, both positive and negative" of this development on the universities: "biotechnology researchers with industrial support publish at higher rates, patent more frequently, participate in more administrative and professional activities, and earn more than colleagues without such support."[2] (These are regarded as positive features, but a plethora of publications from scientific yuppies makes me feel ambivalent.) On the debit side there was a diversion of research activity towards short term projects and an increase in delay or suppression of publication, under the control of the commercial sponsor.

Much of what secrecy is imposed on publication of research done in the universities arises from commercial interest. State supported research, other than that related to defence, has generally been free of similar restrictions in the past. When government departments supported research they naturally expected to be informed of the results and to have sight of proposed publications, with the opportunity to comment on them. The contract then stated that "any comments which the Secretary of State makes shall be considered by the researcher but the researcher shall nevertheless be free to allow publication to go forward in the original form as he thinks fit." That seems to me a visible guarantee of independent comment, constrained only by the pragmatic sanction that a scathing attack on departmental policy might be thought by the research worker to prejudice