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Introduction
In a short review such as this, only a few of many fascinating points of progress in surgery can be touched upon, and it is the author's prerogative to choose those which have particularly interested him during 1972. This survey has been prepared with a mind to those practitioners who do not normally closely peruse the surgical journals, and for this reason broad aspects of advance have been abstracted rather than minutiae of operative technique. A few key references are given to earlier publications, but in the main we quote papers which have appeared during the past year.

Breast of the Breast
Breast cancer remains the commonest killing tumour of women in the Western World; of 1000 females, fifty will develop breast cancer and thirty-five will die of this disease. The mortality has remained almost unchanged for the last 30-40 years. The incidence is higher in the upper social classes, it is commoner in single women and its incidence is less as parity increases; however, this is related to the age of the woman at the birth of her first child, so that if the first baby is born before the age of 18, the woman has one-third less chance of developing cancer than if the first baby is born at 35. Lactation does not seem to be a factor. Early menopause decreases the risk of cancer, and thus hysterectomy and bilateral salpingo-oophorectomy before the age of 40 reduces the woman's chance of developing cancer of the breast to one-quarter of that of the average female population. The risk is increased in women with a positive family history (Campbell, 1972).

It might be imagined that by now clinicians would have determined the best way to manage a patient who presents with an early carcinoma of the breast—one that is not yet clinically disseminated beyond the confines of the breast tissue and adjacent lymph nodes. Surprisingly enough there is more controversy about this particular subject than almost any other topic in tumour therapy, and this is more so today than ever before. All grades of operation are being performed in a spectrum which ranges from simple removal of the lump to super-radical mastectomy; these techniques might or might not be combined with radiotherapy or with ovarian ablation. Each treatment has its enthusiastic group of advocates and yet, despite hundreds of reports, there is little to tell us which is the 'best buy' for the patient (Leading article, 1972).

One fallacy is the clinical staging of the disease on which many protocols of treatment are based and on which some trials have depended. Mere palpation of the axillary lymph nodes is grossly inaccurate; Wallace & Champion (1972), for example, correlated histological findings with clinical staging and found that 25% of patients with impalpable axillary nodes had tumour present on microscopic study, whereas 55% of patients with clinically palpable nodes were free of histological evidence of node metastases. The same authors confirmed that it was the histological grading of the lymph nodes and not their palpability that determined the 5-year survival of the patient. The internal mammary chain of lymph nodes is, of course, completely impalpable and therefore unavailable for clinical staging of breast cancer. Handley (1972) has carried out biopsy of this chain in 900 patients undergoing mastectomy. Biopsy was positive in 9% of cases in which the axillary nodes were clear and 35% of patients in which the axillary nodes were histologically invaded. With increase in size of the primary tumour there was an increasing incidence of positive internal mammary chain biopsies. This study provided some important evidence in prognosis; of 400 patients followed up for 10 years or more there was a 71% survival in those in whom neither the axillary nor mediastinal nodes were involved. This fell to only 11% where both groups of nodes were positive. In patients who had either axillary or mediastinal nodes alone involved the survival rate was 40%. Unfortunately, only histological examination can, as yet, give us accurate information about the lymph node status; the internal mammary chain cannot be demonstrated by lymphography, nor is this technique accurate in the early detection of axillary node metastases (Kett, Lukacs & Varga, 1972). Even more disconcerting than the inaccuracy of lymph node assessment is the finding by Galasko (1972) that no
less than twelve of fifty women (24%) who had apparently early mammary cancer with normal radiographic skeletal survey had evidence of bony deposits on gamma scanning after the administration of radio-active t-fluorine. Undoubtedly, many patients who present to us with apparently early and 'curable' breast tumours already have wide dissemination of disease detectable by these more sophisticated techniques.

Controlled trials

The most important problem to date has been the rarity of carefully controlled trials of the many different methods of treatment. In the few instances where these have been carried out it has been apparent that the choice of treatment has little effect on survival; thus, expectation of life following simple mastectomy combined with radiotherapy is little different from that resulting from extended radical mastectomy, and survival rates following radical mastectomy have not been affected by post-operative radiotherapy. There is urgent need for further prospective controlled trials to determine, first, whether any form of local therapy gives a survival advantage over others. If all suggested techniques in fact give the same expectation of life, it is then necessary to determine which of them gives the best chance of local control of the disease, so that even if the patient must eventually die of disseminated cancer, she may at least be saved the pain and suffering of local ulceration. Finally, it is necessary to determine which method of treatment, given comparable survival rate and local control, is the kindest to the patient, with the least morbidity as regards arm oedema, shoulder stiffness and minimal disfigurement.

No-one should under-estimate the difficulty of such trials. Atkins et al. (1972) reported their trial carried out over the past 10 years to compare wide local excision of the tumour combined with radiotherapy and radical mastectomy combined with radiotherapy. The trial was confined to patients over the age of 50 with clinical stage I and stage II tumours. No significant difference was found between survival in the two groups in clinical stage I cases, but those with stage II tumours showed a statistically better survival in the radical mastectomy group at 10 years. A significantly greater rate of local recurrence was observed in the local excision group, but there was a higher incidence of lymphoedema of the arm in the radical mastectomy patients. The problems of clinical trials in the treatment of breast cancer are well illustrated by the subsequent extensive correspondence which followed the publication of this paper. Thus, initially thiorecta was administered in addition to radiotherapy, but this adjunctive chemotherapy was not continued after 1968; the regimen of radiotherapy was different in the group undergoing the wide local excision and in the group subjected to radical mastectomy; moreover, the dose employed was criticized as being less than optimal for the destruction of residual tumour after surgery (Lee et al., 1972).

Very careful prospective multicentre trials are now in progress, and undoubtedly the next few years will see the resolution of many of our present problems. One national trial in the United Kingdom has been in progress for 2 years; it is designed to study women under the age of 70 with clinical stage I or stage II carcinoma of the breast. A simple mastectomy is performed and in the post-operative period the patients are allocated to either a control group or a group receiving a standardized course of radiotherapy. Documentation and pathological reporting is standardized and the information is stored on a central computer (Baum, Edwards & Magarey, 1972). Already 1050 patients are included in the study. It is too early for any preliminary results with regard to differences between the two forms of therapy to be evident, but already some interesting observations have been made; of the first 161 patients in the 'watch-policy' group, forty were judged to be in stage II, and here no less than 75% of the axillary lymph nodes have regressed. The regression was apparent at the first follow-up examination 3 months after mastectomy and has persisted. It may be that a proportion of the nodes which have regressed did so because of the removal of the tumour and, with it, the stimulus to sinus histiocytosis, but it remains to be seen whether in other cases lymph nodes containing malignant cells are still capable of exerting some protective process against further growth (Edwards, Baum & Magarey, 1972).

Locally advanced breast cancer

Occasionally patients present with locally advanced carcinoma of breast but without clinical or radiological evidence of disseminated disease. These women form a rather special group as regards treatment, since it is important, if possible, to obtain control of the local lesion and to prevent the misery of ulceration, discharge, odour and bleeding from the fungation of the primary tumour. The conventional treatment for advanced local breast cancer is undoubtedly radiotherapy, but although remarkable shrinkage of the tumour mass and healing of ulceration may occur, local recurrence is far from uncommon (Leading article, 1973). Sonneland (1972) treated an elderly lady with a fungating carcinoma of the breast by means of zinc chloride paste followed by skin graft to the raw area, after biopsies had shown that the tumour had been completely cleared. The advantages of chemosurgery, coagulation or cryosurgery in these advanced lesions still remain to be
assessed. We have reported twenty-four patients with locally advanced breast cancer treated by supervoltage radiotherapy to a maximum tumour dose of approximately 6000 rads, followed 4–16 weeks later by simple, extended or radical mastectomy (Stoker & Ellis, 1972). Primary wound healing was achieved in each case. In a follow-up of from 2 to 10 years, three patients have to date developed local recurrence. Seven patients are dead and in six there was no local tumour present at the time of death. Twelve patients have survived 3 years or more following surgery and three of these have no signs of disseminated disease. This study suggests that toilet mastectomy may be a reasonable procedure in selected cases following radiotherapy for advanced local breast cancer, but obviously a multicentre controlled trial is required to establish whether or not mastectomy improves the quality of survival in these patients compared with those treated by supervoltage radiotherapy alone.

### Changing fashions in peptic ulcer surgery

Vagotomy has become increasingly more popular in the surgical treatment of duodenal ulcer over the past quarter of a century, but the procedure has undergone repeated modification. The original operation of total or truncal vagotomy entailed complete division of the vagi at the oesophageal hiatus. This denervates not only the stomach but also the gut as far as the mid-colon and the gall bladder, pancreas and liver. Gastric stasis, which accompanies this operation, requires the addition of a gastric drainage procedure—either gastroenterostomy, pyloroplasty or antrectomy. Selective vagotomy was then introduced, which aimed at denervation of the stomach but not the other intra-abdominal viscera. Now, highly selective vagotomy (otherwise called selective proximal vagotomy or parietal cell vagotomy) has recently been introduced. This aims at denervation of the acid-secreting cells of the stomach but preservation of the nerve supply of the antrum, so that it is claimed that the addition of a drainage procedure is not necessary. It remains to be seen, however, whether this procedure will stand the test of time. The results of numerous clinical trials have been reported during the year.

Humphrey et al. (1972) compared the incidence of dumping after either truncal or selective vagotomy with pyloroplasty, and highly selective vagotomy without a drainage procedure. Dumping was found to be significantly less frequent in patients who had undergone the highly selective procedure without drainage. Johnston et al. (1972b) studied the incidence of diarrhoea after these three operations; diarrhoea was recorded in 24% of patients after truncal vagotomy and pyloroplasty but in only 2% of patients after highly selective vagotomy without drainage procedure. These authors suggest that post-vagotomy diarrhoea can be attributed both to unregulated gastric emptying due to the drainage operation and to the extra-gastric denervation produced by truncal vagotomy.

Claims that selective vagotomy can be carried out without a drainage procedure have been made in a number of publications, but Clark et al. (1972) report two independent trials carried out in Birmingham and Liverpool; ten of the fifteen patients studied had their gastric emptying times measured pre- and post-operatively, and all showed significant delay after selective vagotomy without drainage. Three patients in this study have developed a gastric ulcer and one of these, in addition, had recurrence of the duodenal ulcer. The operation of selective proximal vagotomy (highly selective vagotomy) without gastric drainage, although associated with early encouraging results (Hedenstedt et al., 1972; Johnston et al., 1972a), has had even less time for long-term assessment. Here a note of caution has been introduced by Wastell et al. (1972); in sixteen patients treated by selective proximal vagotomy without gastric drainage two definite recurrent ulcers had occurred within a year of surgery and both required re-operation; a further patient had symptoms and a barium meal appearance strongly suggestive of recurrent ulceration. These authors advise surgeons to await the results of further trials before carrying out many of these operations without gastric drainage. A report of a case of gastric ulceration after highly selective vagotomy without drainage (Hall, 1972) adds further weight to this advice.

The reason for the almost universal current popularity of vagotomy and pyloroplasty is undoubtedly its simplicity compared with the more radical procedure of partial gastrectomy, and also its appeal as being a more 'physiological' surgical approach to the problem of duodenal ulceration. A most surprising and important report from Goligher et al. (1972) has compared total vagotomy and pyloroplasty with vagotomy and gastroenterostomy, vagotomy and antrectomy and subtotal gastrectomy. Recurrent ulceration was commoner after vagotomy and pyloroplasty than after all the other operations. Moreover, the overall assessment by the Visick functional grading gave poorer results after vagotomy and pyloroplasty than after any of the other operations. These authors conclude that truncal vagotomy and pyloroplasty has not lived up to expectations and its place as the currently most popular procedure in the elective surgical treatment of duodenal ulcer should be reconsidered. Under both headings of recurrence and functional grading antrectomy and subtotal...
gastrectomy gave the best results in this particular study. Undoubtedly, in expert hands the immediate and long term results of partial gastrectomy for duodenal ulcer can be extremely good; McKeeown (1972) has reported a personal series of 800 cases followed up for a 10–20 year period. The hospital mortality in 778 elective procedures was 0·7%, and in twenty-two emergency gastrectomies for haemorrhage was 22·7%; 79% of cases were graded as Visick I and 15% as Visick II. Stomal ulceration occurred in sixteen cases (2·8%); all were re-operated on and thirteen were converted to a satisfactory status. No established case of post-gastrectomy bone disease occurred in the whole series. Such magnificent results cannot be expected to be achieved in average hands. Postlethwait & Johnson (1972) reviewed 2819 patients undergoing elective surgery of all types for duodenal ulcer in American Veterans Administration Hospitals with a 2·8% mortality. Interestingly enough the mortality was two and a half times higher in obese subjects than those of normal build.

Although in average hands vagotomy is a simpler and safer procedure than a partial gastrectomy, it nevertheless has some complications peculiar to itself. Price, Powis & Morrissey (1972), for example, report oesophageal rupture as a complication of truncal vagotomy in 0·8% of a collected series of 4026 patients in the Midland region. Of these forty-one cases, there were four deaths; death is especially likely to occur, not unnaturally, when the perforation is overlooked at the time of surgery and only diagnosed because of subsequent pneumoperitoneum, empyema, or pneumothorax. Musgrove (1972) has reported an example of the unusual complication of a chylous fistula during an abdominal truncal vagotomy, probably by division of an aberrant lacteal. Early exploration and ligation of the offending lymphatic is recommended in such a case.

Any student of the history of the surgery of duodenal ulceration is impressed by the initial enthusiasm with which each operation is introduced, with its disadvantages only becoming apparent as patients are followed-up year after year. Factors such as the surgeon’s skill and experience and the selection of patients undoubtedly play an important role, although one that is difficult to measure. Most surgeons find that their best results follow surgery on patients with severe local disease and a less happy outcome when there is ‘a small ulcer in the duodenum and a large ulcer in the mind’. We have found, for example, that uniformly excellent results follow vagotomy and drainage for those patients whose duodenal ulcer has reached the stage of gross organic pyloric stenosis (Ellis, 1972). McColl et al. (1971) have shown that psychological testing pre-operatively can give a fairly accurate prediction of those patients who are likely to achieve a poor result from their gastric surgery.

**Vagotomy for gastric ulcer**

A small proportion of gastric ulcers are due to gastric retention, either secondary to pyloric stenosis or to atony of the stomach following vagotomy without drainage. The aetiology of gastric ulceration in the great majority of cases is quite unknown, but this has not deterred surgeons from carrying out the various types of vagotomy, with or without drainage, in the treatment of this condition; after all, did not John Hunter advise Edward Jenner, ‘Do not think, try the experiment’? Clarke, Lewis & Williams (1972) report a series of sixty-eight patients with gastric ulcer who were treated by vagotomy and pyloroplasty. In a follow-up period averaging 3 years, four patients have developed recurrent peptic ulceration requiring further surgery. Of fourteen patients who presented with acute haemorrhage, one subsequently required gastrectomy for continued bleeding, but the others have obtained satisfactory results to date. Of twenty-one patients with a high gastric ulcer, one has suffered recurrence. The authors conclude that vagotomy and pyloroplasty is a satisfactory form of treatment for a high or bleeding gastric ulcer, but that for all other gastric ulcers some form of gastric resection is preferable. Kennedy, Kelly & George (1972), in a 3 year average follow-up period, report four recurrent gastric ulcers occurring among thirty-three patients with an ulcer situated on the lesser curve or body of the stomach. However, among forty-two patients with an ulcer situated in the antrum or with an associated duodenal lesion there was only one recurrence. These authors also consider that gastrectomy is to be preferred in the straightforward case of gastric ulceration. Miguel (1972) has had four recurrent ulcers in a series of forty-two patients undergoing vagotomy and drainage for gastric ulceration. A review of recent published figures by Bynhum, Hartsock & Jacobson (1972) finds an average recurrence rate of 6%, following this procedure—clearly inferior to the results of partial gastrectomy. Johnston et al. (1972c) have treated fourteen patients with gastric ulcer and five with combined gastric and duodenal ulcers by means of highly selective vagotomy without drainage in the past 3 years. It is interesting that spontaneous acid output and acid response to meat extract was low in all cases and none had evidence of stenosis. Each patient had the ulcer excised entirely at operation in order to confirm its benign nature. Post-operative barium meal examination in eleven patients followed up for 9 months or more demonstrated satisfactory healing and effective gastric emptying and, to date, all the patients are symptomless. Although this study is encouraging it must be remembered that the
follow-up period is short and all experienced surgeons are well aware of the dangers of early good results in gastric surgery. In particular, one must remember that an old operation for gastric ulcer was merely its local excision, a procedure which was carried out in all Johnston's cases in addition to the parietal cell vagotomy!

Post-operative gastric suction

Because of the fear that the denervated stomach would fail to empty after vagotomy, nearly all surgeons in the early days of this procedure employed either post-operative nasogastric suction or else gastrostomy drainage of the stomach for a period of up to 10 days following surgery. With increasing experience, more and more surgeons in the United Kingdom have given up this practice, adopting what Hendry (1962) called 'tubeless gastric surgery'. We found, for example, that even in the presence of gross pyloric stenosis post-operative nasogastric suction was not required following vagotomy and either pyloroplasty or gastrojejunostomy (Ellis, 1972). Miller et al. (1972) have carried out a randomized trial comparing no tube, nasogastric aspiration for 48 hr, and gastrostomy drainage for 8 days in patients undergoing vagotomy and either pyloroplasty or gastroenterostomy. Of forty-three patients treated without gastric decompression, only one required the passage of a nasogastric tube post-operatively. In addition to the fact that the patients in the 'tubeless' group were much more comfortable, there was a significant decrease in post-operative chest complications, wound infection and dysphagia in this group. This agrees well with a previous study carried out by Barnes & Williams (1967) on similar groups of patients who were not, however, subjected to a randomized controlled trial.

American surgeons have been more conservative in their approach to this problem, but now more and more are following the British practice. Kerry, Hoshal & Ruiz (1971) report on 200 patients divided into two groups of 100 treated with and without nasogastric suction following vagotomy. Of the 100 treated without a tube seven were intubated in the post-operative period, four probably unnecessarily! There was a 16% post-operative pulmonary complication rate in the tubeless group compared with 23% in the intubated patients. Herrington (1972) reports his cautious trial of tubeless gastric surgery. The nasogastric tube was employed, but removed 8–12 hr post-operatively; however, no fluids at all were given by mouth for 72 hr following surgery. In 815 elective patients following vagotomy sixty-two required post-operative suction (7.6%), the indications being a difficult technical operation, post-operative distension, nausea or vomiting. Nachlas et al. (1972), as a result of post-operative barium studies, conclude that nasogastric suction is only needed in patients with obstruction, gastric dilatation or where it is necessary to observe for post-operative haemorrhage. In other cases its use can be avoided, to the great relief of the patient.

There is little doubt that in the early stages of evolution of major gastric surgery a nasogastric tube might well have been useful or even lifesaving. Under modern conditions, where relatively non-toxic anaesthetics are used, where fluid replacement is well understood, where the patient is electrolytically restored pre-operatively, where relativelyatraumatic techniques of anastomosis have been developed, and where drugs like chlorpromazine are available to prevent nausea in the post-operative period, the incidence of post-operative gastric dilation or emesis is so low that routine gastric suction, with all its discomfort to the patient and embarrassment to his breathing, can now be eliminated.

Liver and biliary system

Liver trauma

Road accidents are responsible for most cases of abdominal injury in this country, and the incidence of damage to the liver has risen with the increase of high-speed traffic. Better techniques of resuscitation and surgery have undoubtedly improved the once very serious prognosis in this situation. Blumgart & Vajrabukka (1972) reviewed forty-four cases of closed injury of the abdomen requiring laparotomy. Thirty-five of these were due to motor vehicle accidents; twenty of the forty-four cases had liver injuries, and in eighteen of these there were associated injuries, particularly to the head chest and skeletal system. The authors classified their cases into minor and major. The minor cases were those in which the liver laceration could be closed by suture with complete control of haemorrhage. This accounted for fourteen of their patients, only one of whom died, and that from severe associated injuries. Major liver injuries were defined as ones with a laceration so extensive that the hepatic wound could not be closed by simple suture, and was often associated with internal disruption of liver tissue. Of the six cases of major injury in this series, the first died of haemorrhage after packing the wound. The second was treated by simple suture, bleeding continued and a right hemi-hepatectomy had to be performed, with subsequent death. Following this, the authors' policy changed to partial hepatectomy, and in the subsequent four cases there were three survivals, the death being associated with other multiple injuries.

The post-operative complications in these seriously injured patients include jaundice, for which no complete explanation is available, and a haemorrhagic
diathesis which results from disseminated intravascular clotting which produces an acute defibrination syndrome. Intravascular clotting is presumed to be activated by the release of tissue thromboplastin as the result of massive liver injury.

Mercadier, Clot & Cady (1972), from Paris, report their experience of ten patients who underwent right hepatectomy in the treatment of liver trauma. There were six survivors. These authors confirm that hemihepatectomy for trauma to the right lobe of the liver is justified in severe bursting injuries, uncontrollable haemorrhage resulting from a tear to the right hepatic vein or an injury to the inferior vena cava, or in cases where a hepatic laceration has been sutured without realizing the extent of the injury, and where subsequent haemorrhage, necrosis, secondary infection or haemobilia make further surgery obligatory. These authors favour the simple technique of clamping the portal pedicle and then fracturing through the liver substance with the fingers, tying off blood vessels and bile ducts as encountered, rather than the so-called anatomical hepatectomy with preliminary dissection of the hepatic vessels and bile ducts in the porta hepatitis, since the latter is a time-consuming procedure.

The experience of European surgeons fades into insignificance compared with that of their American colleagues in the field of abdominal trauma. Lim, Knudson & Steele (1972) report 285 cases of liver injury, of which 182 were open (ninety-nine gunshot wounds and eighty-three stabblings) and 103 were due to blunt trauma. Major resections were required in 14%, the indications being identical to those already described. White & Cleveland (1972) give an account of 126 patients treated for liver trauma over a 3-year period at their hospital in Los Angeles. Seventy-seven had penetrating liver wounds. In spite of the fact that fourteen patients required emergency hepatic resection, the mortality was only eight in the whole series (6-3%). The presence of associated injuries was the greatest factor adversely affecting survival, since seven of the eight deaths were victims of multiple trauma.

Not all surgeons consider that partial hepatectomy is necessarily the treatment for severe liver trauma. May (1972) advocates ligation of the hepatic artery supplying the traumatized lobe as a means of controlling haemorrhage. After 7–10 days the lobe or segment is revascularized by collaterals from the uninjured side. Morton, Roys & Bricker (1972) review an enormous experience from Houston, Texas, of 1068 liver injuries treated between 1939 and 1970. The mortality rate has declined from 64% initially to a present rate of 11.7%. Hepatic lobectomy was used rarely. Hepatic venous bleeding is now controlled by a new technique in which an internal shunt is introduced into the inferior vena cava through the right atrium; this was utilized successfully in five patients.

It is well known that the liver has remarkable powers of regeneration. Blumgart, Leach & Karran (1971) have made some interesting observations on their five patients after right hepatic lobectomy, which effects an approximate 50% resection of liver substance. One patient who came to necropsy 10 days after operation was found to have a liver which had quite remarkably already achieved its estimated pre-operative weight. Serial scans of the liver in three surviving patients demonstrated an early increase in the size of the liver during the first 10 post-operative days, with little or any further increase in size in the ensuing 9 months. This work suggests a much more rapid restoration of liver mass occurs in man than previous estimates, which computed that complete restoration of the liver might take 4–6 months to achieve.

Malignant obstructive jaundice

Malignant obstruction of the bile ducts by either an intrinsic cancer or from carcinoma of the head of the pancreas is occasionally amenable to radical curative surgery. Unfortunately, the most we can achieve in the majority of cases is temporary palliation. Elmslie & Slavotinek (1972), from Adelaide, discuss some of the problems presented by patients with inoperable cancer of the head of the pancreas. It is first necessary to try and make an accurate differential diagnosis from non-malignant conditions; the operative finding of a grossly dilated thin walled common bile duct is typical of obstruction by a cancer and in marked contrast to the white, opaque and thick walled duct which is so often seen in obstruction due to chronic pancreatic or biliary inflammatory disease. Cholangiography is also of value, but the surgeon may have to resort to transduodenal biopsy. Biliary decompression by means of a cholecyst-enterostomy should be combined with a gastro-enterostomy if the operative findings suggest that duodenal obstruction from the invading cancer is likely to occur. If the upper level of the growth is encroaching on the site of entry of the cystic duct into the common duct, then the common duct itself rather than the gall bladder should be used for decompression in order to prevent recurrence of jaundice as tumour extension takes place. Pain relief may require coeliac ganglion alcohol block by the dorsal route.

Terblanche, Saunders & Louw (1972), from Cape Town, review their experience with twenty-one cases of carcinoma situated at the junction of the common hepatic with the main hepatic ducts. Although radical surgical therapy is not possible, worthwhile palliation may be achieved by opening the common bile duct below the obstruction, dilating the malignant
striction and keeping it open by means of an indwell-
ing tube. Unfortunately, these tubes tend to become
occluded, but the authors describe an ingenious
technique of threading a U-tube from the abdo-
nominal wall which passes through the common bile duct,
traverses the growth, and emerges through the sub-
stance of the liver onto the abdominal wall. If
occluded or dislodged it can be replaced by simple
railroading without the need for further operative
procedure. Seven of their patients survived for
longer than a year, and three are still alive, 2–3 years
after the first operative intervention. Niloff (1972)
has described a flanged vitallium prosthesis which he
has found useful in the palliative intubation of
obstructing cholangiocarcinomas.

If the tumour of the bile duct is more distally
placed, resection may be possible. Warren, Moun-
tain & Lloyd-Jones (1972), from the Lahey Clinic,
have reviewed seventy-seven cases of malignant
tumour of the bile ducts and found that radical
surgery was possible in twenty-four of these, in
which seventeen survived for more than a year, and
five are still alive over 3 years later. Surgery com-
prised either pancreaticoduodenectomy, or resection
with end-to-end anastomosis. Since 1965 hepatic
artery infusion chemotherapy has been used at the
Lahey Clinic for non-resectable lesions of the bile
ducts, and this was employed in fifteen patients.
Nine were still alive after 1 year and one patient is
alive more than 3 years later. Chemotherapy is com-
bineded in these cases with palliative dilatation of the
malignant stricture and insertion of a rubber stent
in order to overcome the obstructive jaundice.

Of course, the ultimate treatment of intrahepatic
primary cancer is total hepatectomy and liver trans-
plantation, but current results are far from encourag-
ing. Williams (1972) has reviewed his experience of
nineteen cases from King’s College Hospital, of
which five were hepatic duct carcinomas and five
primary hepatomas. Eleven died without leaving
hospital and two are recent cases. Six patients left
hospital, but four of these died up to 11 months
post-operatively and only two are alive in their
seventh and seventeenth month.

**Gall stones and their dissolution**

Recent exciting studies have suggested that
cholesterol stones may be associated with the pro-
duction by the liver of bile which is supersaturated
with cholesterol with respect to phospholipid and
bile salts, and with a diminished bile salt pool
(Admirand & Small, 1968). Mackay *et al.* (1972)
report a study of the bile of seventeen patients with
gall stones compared with twenty-one patients
suffering from duodenal ulcer, the bile in the latter
being obtained by duodenal aspiration. The gall
bladder bile from the gall stone patients contained
significantly more cholesterol than the bile obtained
from the ulcer patients, and the hepatic bile in the
gall stone group contained significantly more chole-
terol than the gall bladder bile. Not all the patients
in this study, however, had supersaturated cholesterol
in their bile; of the seventeen stone patients, five had
hepatic bile whose relative composition lay outside
the limits of cholesterol solubility, three were at the
limits, and the remaining nine patients had bile which
was undersaturated with cholesterol. It may be, of
course, that the hepatic bile is not always super-
saturated with cholesterol (as has been demon-
strated by Smallwood, Jublonski & Watts, 1972),
and may vary, for example, with diet, or that super-
saturation had been present some time in the past
and had initiated gall stone formation. It may also
be that supersaturation of bile with cholesterol is
only one factor in stone formation and that other
circumstances, such as the presence of mucus, infec-
tion, protein or stasis in bile, may render mixed
micelles unstable, thus resulting in precipitation of
cholesterol and the initiation of stone production.

This chemical basis of the production of at least
some gall stones leads to the possibility of their
chemical dissolution. Bell *et al.* (1972) have shown by
*in vitro* experiments that rapid dissolution of human
gall stones will take place in monkey’s bile if associ-
ated with undersaturation of the bile, a high chole-
terol content in the stone, and a high surface area
of stone compared with its weight. The presence of a
radio-opaque outer rim of calcium on the stone
delays its solution. Danziger *et al.* (1972), from the
Mayo Clinic, have shown that chenodeoxycholic
acid induces the formation of unsaturated bile in
patients with cholesterol stone and increases the bile
acid pool in these subjects. Six women with chole-
terol stones were treated with oral chenodeoxycholic
acid with disappearance of the stones in one patient
and progressive diminution in size in three others
after 6–18 months. Bell, Whitney & Dowling (1972),
at the Postgraduate Medical School, London, now
report the treatment of seventeen patients with gall
stones contained within a functioning gall bladder.
After 6 months treatment with chenodeoxycholic
acid, repeat radiography showed disappearance of
the stones in four cases, reduction in size in a further
four and no change in the remaining nine patients.
Three further patients with non-functioning gall
bladders on cholecystography showed no return in
function.

These preliminary reports are naturally received
with considerable interest because of the definite
possibility of removal of cholesterol stones in
patients whose symptoms are mild enough to enable
the clinician the long period of time required for
stone dissolution to take place. Where symptoms are
pressing, of course, surgery still remains obligatory.
Congenital anomalies of the testis

Many of the misconceptions which surrounded the subject of maldescent of the testis have yielded in the face of careful scientific studies (Schorer & Farrington, 1971). It is now agreed that a testis which has failed to enter the scrotum within a few months of birth will not do so spontaneously; those cases in which this was said to occur we now recognize as examples of retractile testis misdiagnosed as cases of maldescent. It is easy enough by patient examination to be able to coax such a testis into the scrotum and to reassure the family that the child is perfectly normal. It is now also agreed that the operation in cases of maldescent should be carried out at about the age of 5 years, since histological development of the testis is only slightly delayed at this age, whereas the tissues are by now sufficiently developed to render surgical handling relatively easy, and there is, moreover, minimal interference with the child's schooling. There is certainly no point in delaying the operation in the misguided hope that descent might take place at puberty. In cases with an associated troublesome inguinal hernia, surgery may indeed be indicated at an earlier stage than 5 years of age. All sorts of complicated techniques have been described for maintaining the testis in the scrotum at surgery, but many now favour the very simple method in which the testis is held in the scrotum simply by placing it in a superficial pouch fashioned between the skin of the scrotum and the dartos muscle. This has been well described by Pryn (1972), who reports satisfactory results in twenty-five patients.

It is well recognized that the descended testis has a much greater chance of undergoing malignant change than a normal organ (and this applies also to the descended testis which has been brought down into the scrotum). Riegler (1972) reports an example of torsion of an intra-abdominal testis in which a seminoma had developed. He was able to collect thirty-three other examples of this situation, in twenty-two of which malignant change had occurred. He noted that diagnosis of intra-abdominal torsion was rarely made pre-operatively, in spite of the fact that one or both testis were missing from the scrotum. It is a wise surgeon who makes a testis-count on all his male patients!

The subject of torsion of the testis has been of considerable recent interest, not that there is anything fresh to say on the treatment of the subject, but there is at least an increasing awareness of the large number of young people in whom the diagnosis is made too late, with resultant hopeless infarction of the organ. As we have mentioned, torsion may occur with an intra-abdominal testis, but the vast majority take place when there is a congenital abnormality known as the 'bell-clapper' deformity, in which the testis and epididymis hang freely inside the tunica vaginalis on the spermatic cord. This intravaginal torsion of the testis may occur at any age, although it is commonest in adolescence. Extra-vaginal torsion of the whole spermatic cord is confined to new-born and this is rare. Chapman & Walton (1972) have reviewed 100 cases of torsion of the testis or its appendages at the London Hospital. In eighty-five instances there was torsion of the testis, in fourteen torsion of the hydatid of Morgani and in one there was torsion of a lipoma of the scrotum. One case of testicular torsion was bilateral. The important finding was that in thirty-eight of the patients with testicular torsion there had been one or more preceding attacks of pain and swelling due to a torsion which had spontaneously untwisted. In nineteen cases operative fixation was performed because of this preceding story and all these testes were saved. In the other nineteen cases, the testes were not explored until the patient presented with a severe episode, and seven of these testes were lost from either gangrene or delayed atrophy. Twenty patients were misdiagnosed and initially treated as epididymo-orchitis, although there was no evidence of urinary tract infection. These authors point out first, the importance of 'warning' attacks of pain, and second, the advisability of exploring any acutely swollen and painful testicle which is not accompanied by definite evidence of urinary or urethral infection. The other testicle is explored and fixed at the same time, and in most of the cases there will be found to be a similar anatomical abnormality to that of the side in which the torsion has occurred. Krarup (1972) underlined the importance of early accurate diagnosis; in eleven cases where this was achieved, the testis was saved, but in eleven further patients where diagnosis was wrong or delayed, often with antibiotic therapy for misdiagnosed 'epididymitis', orchidectomy had to be performed when the patient came to eventual surgery.

A useful diagnostic point is stressed by Moore (1972), who points out that the original pain felt with torsion of the testis is in the lower abdomen just above the internal inguinal ring; only when its overlying coverings are affected is the testis itself painful. This referral of the pain is responsible for some early cases being misdiagnosed as appendicitis, or some other abdominal problem. Although the 'bell-clapper' deformity cannot be detected clinically in the painful swollen torted testis, the abnormality may be seen with considerable frequency in the opposite, unaffected testis, which is liable to the same congenital anomaly. This was pointed out by Angell (1963). Corriere (1972) now reports that in eighteen consecutive cases of torsion of the testis he found that the opposite testis lay with its long axis horizontal; this can only be detected accurately when the
patient is examined in the standing position. This clinical test is an important pointer to the diagnosis. A rare, but interesting, entity is noted by Phillips Holmes (1972), who report nineteen patients with torsion of an ectopic testis in the superficial inguinal pouch, immediately outside the external ring of the inguinal canal. No less than eighteen of these patients had spastic paralysis. Since many of these were mentally retarded, diagnosis was difficult and often delayed.

The doctor who first sees a new patient with torsion of the testis should immediately attempt manipulation which may be aided, if necessary, by a preliminary injection of morphia. Burton (1972), as Medical Officer of the Student Health Service in Sheffield, reports six successful manipulations on young men between the ages of 15 and 22. Subsequently, both testes should undergo operative fixation as a prophylactic against subsequent episodes.

Post-operative wound infection

Post-operative wound infection is still a common and important complication of general surgical procedures. Under the conditions which exist in most modern operating theatres, the majority of wound infections follow either potentially contaminated operations, which include the surgery of the hollow muscular organs (gut, biliary system, urinary system, etc.), or where there is frank infection, such as purulent peritonitis, present at the time of operation. The so-called 'clean' operations, such as hernia repair, have a low infection rate, in the region of 2–4%, but this rises to the region of 20% in operations on the gastro-intestinal and biliary tracts; this is particularly the case when the large bowel is opened or when biliary surgery is carried out in the presence of infected bile (Engstrom et al., 1972). The use of plastic drapes appears to have no effect at all on lessening the rate of this endogenous infection, as was shown by the careful controlled trial carried out by William et al. (1972).

Since wound sepsis is now so often associated with intestinal organisms (including Escherichia coli, Streptococcus faecalis and Bacillus proteus) split into the wound at the time of surgery, there is strong theoretical support to the use of local antibiotics in these potentially contaminated wounds in order to deal with the contaminating bacteria before infection can become established. Particularly in operations where the gastrointestinal or biliary tracts have been opened, topical ampicillin in a dosage of 1 g in powder form appears to be the antibiotic of choice. Andersen, Korner & Østergaard (1972) report a random trial in 240 patients undergoing colonic resection or abdomino-perineal excision of the rectum. The infection rate in those receiving topical ampicillin was 2.5%, compared with 18.3% in the control cases. There was no difference in the rate of wound breakdown in the two groups. In our own study (Stoker & Ellis, 1972) ampicillin was compared with a penicillin and sulphadiazine combination as a topical wound application in patients undergoing biliary or gastro-intestinal surgery; eleven of the fifty-three patients having topical penicillin and sulphadiazine developed wound sepsis (20.8%) compared with four of the fifty-nine patients receiving ampicillin (6.8%). This difference is statistically significant. In another study we have shown that ampicillin is superior in this respect to noxythiolin powder (Stoker & Ellis, 1971). Indeed, noxythiolin in powder form appears to act as a chemical irritant, since there were ten examples of infection in only twenty-five patients in which this powder was used, eight of the infections comprising sterile pus or growing Staphylococcus albus only. The advantage of topical antibiotic powder is that an extremely high concentration of this substance is achieved at the very time when potential bacterial contamination takes place, the concentration of antibiotic being far higher than can be obtained by systemic administration, and yet being without the disadvantages and potential dangers of a full systemic antibiotic course, which include Candida infections (Gaines & Remington, 1972). It is interesting in this context that Pollock & Tindall (1972) found no statistical difference in the infection rate of patients receiving a single intravenous injection of 500 mg of ampicillin immediately pre-operatively and untreated controls, whether these were clean, potentially contaminated, or frankly contaminated cases. However, Fullen, Hunt & Altermeier (1972), in a study of prophylactic antibiotics in penetrating abdominal wounds, found dramatic differences in their cases of colon perforation. Patients where antibiotics were commenced pre-operatively developed wound infection in 6%, while those whose therapy was started either pre- or post-operatively had a wound infection rate respectively of 35 and 60%.

It is interesting that many aspects of surgical ritual are coming under close scientific, and particularly bacteriological, scrutiny. Doig (1972) has recently compared the aerial contamination which follows the use of conventional theatre clothes, special theatre garments, which include elastic arm bands and the addition of cotton bloomers for females, and the use of ordinary outdoor clothes. Surprisingly enough, contamination was least when ordinary outdoor clothes were worn. All three types of dress had bacterial dissemination reduced by about half when gowns, masks, caps and boots were worn. Aside from comfort, this study suggests that outdoor clothes need not be removed in theatre or any clean area provided that gown, mask, etc. are worn. A recent study from
Westminster Hospital (Selwyn & Ellis, 1972) investigated the bacteriology of biopsy specimens of skin. These enabled a very complete harvest of surface organisms to be obtained. Information about deeply placed skin organisms was collected by examining sections of skin biopsies after incubating for 6 hr or more on agar. The predominant flora consisted of non-pathogenic Staphylococcus/Micrococcus strains and diphtheric bacilli. The bacteria were found to be situated in the hair follicles, and after incubation they could be seen exuding up the mouths of these follicles. These residents are rarely pathogenic, and indeed in over 20% of subjects produced antibiotics against a wide range of pathogens. These biopsy studies confirmed that the patient's skin can be readily cleared of virtually all non-sporing contaminants by swabbing with 0·5% chlorhexidine or 1·5% iodine in alcohol allowed to act for 30 sec. Only in the special case of tissue ischaemia, for example, amputation of a ganгрaneous limb in advanced arteriosclerosis, does it appear that more vigorous skin preparation is necessary in order to remove spore-bearing organisms, and here also prophylactic systemic penicillin is required to prevent clostridial infection.

Starch granuloma within the peritoneum

A large number of substances which find their way into the peritoneal cavity may stimulate granuloma formation, a sterile peritonitis, extensive intra-abdominal adhesions, or any combination of the three. The first material to be implicated was talc (magnesium silicate), which was introduced as a dusting powder for surgical gloves. This was therefore abandoned and replaced by starch powder in 1947, in the hope that this would be completely absorbed within the peritoneum. Unfortunately, in subsequent years isolated examples were reported of granuloma formation following the use of this substance. The diagnosis is readily confirmed by microscopic examination of the tissue under polarized light, which demonstrates the characteristic Maltese cross appearance of the birefringent starch granules. Holmes & Eggleston (1972) have reported a series of thirteen patients with starch granulomatous peritonitis. The syndrome is typically seen between 10 and 30 days after laparotomy. The symptoms and physical findings give a picture suggesting either intestinal obstruction, intra-abdominal infection, or both. Typically there is a pyrexia between 100° and 102°F with an elevation of the white blood count. Operative findings show a thickened nodular omentum, ascitic fluid, small miliary nodules scattered over the serosal surfaces and dense adhesions. Unless the condition is borne in mind, the surgeon may diagnose miliary tuberculosis, or, more dangerous still, carcinomatosis peritonii. The disease appears to be self-limiting, and there are no documented cases of a second episode. Coder & Olander (1972) report three cases, two of whom were given steroids following operative confirmation of the diagnosis; both showed rapid clinical response and were well within 48 hr. Ignatius & Hartmann (1972) report seven confirmed cases of the starch peritonitis syndrome. One of these was symptom-free, but multiple nodules were found at re-operation for an aortic aneurysm 7 months following cholecystectomy. These authors encountered six more clinically suspected cases, five of which settled within 2–6 weeks of conservative treatment, although a sixth patient continued to have a pain for 5 months. Three of these patients were given steroids and there was a clinical impression of response to this therapy. However, the same authors (Hartmann & Ignatius, 1972), found that a single injection of hydrocortisone failed to produce any observable effect on the granulomatous reaction of intra-peritoneal starch in mice. Obviously, further clinical and laboratory investigations are required to study the role of steroids in this context.

An important help in diagnosis of this condition may be abdominal paracentesis. Warshaw (1972) carried out this procedure in nine suspected cases of starch peritonitis. Ascitic fluid was obtained which was clear, contained mononuclear white cells, and, in seven examples, contained starch shown by iodine staining or polarized light. All aspirates were sterile on culture. Ten control post-operative patients underwent paracentesis; the fluid contained smaller numbers of white cells and no starch. Re-exploration was avoided in all nine cases, with recovery in each instance.

The detailed pathology of this condition has been well described by Davies & Neely (1972). They studied nine cases, eight following surgery, the ninth resulting from three aspirations for ascites. The material was obtained from 12 days to 11 months after surgery. The pathologist may encounter starch under three circumstances; extraneous particles found indiscriminately in the mounting medium, freshly implanted starch in blood clots and on the surface of the specimen but with no phagocytic response, and intrinsic, where the granules are almost all found within histiocytes, giant cells, or areas of necrosis. Only the last, of course, is of clinical significance.

Naturally, most surgeons presenting series of cases of starch granuloma advise special precautions of glove washing and drying in order to remove any trace of glove powder. However, in a series of experiments which we reported at the Association of Surgeons in 1972 (Jagelman & Ellis, 1973), we found that careful washing of the gloves did not remove the starch powder completely but merely
clumped the starch granules together. In animal experiments we noted that small amounts of starch powder could be completely absorbed from the normal peritoneal cavity of the rat, although large amounts (between 0.5 and 1.5 g) would result in extensive granuloma formation. However, the same small amount of starch powder (0.01 g), which was innocuous in the intact peritoneal cavity, would produce granulomas and adhesion formation in the presence of peritoneal injury, presumably in association with the fibrinous exudation resulting from this trauma. Possibly only small amounts of starch powder are necessary in the traumatized peritoneal cavity in order to precipitate adhesion formation. It is obvious that the ideal lubricant for the surgical glove remains to be discovered.

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Starch granuloma


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