

Advances in Resectional Hepatic Surgery

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SUMMARY

The past decade has seen an improvement in the results of hepatic resectional surgery. This has been due to several factors, of which improved diagnostic method is the most important.

Careful patient selection and pre-operative preparation are essential. Advances in surgical technique will in future result in better prognosis, and bigger resections also assist in the understanding of hepatic function.

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Increasing interest in hepatic allotransplantation in recent years has tended to overshadow the steady advances that have been achieved in resectional hepatic surgery.

Although early reports of partial hepatic resections exist in the literature,¹⁻³ the majority of these were limited non-anatomical resections frequently resulting in uncontrollable haemorrhage and devitalization of remaining liver tissue. The present era of hepatic resection, however, was to await a clear definition of the segmental vascular anatomy.^{4,5} Armed with a knowledge of the main lobar fissure and the left segmental fissure, planned anatomical resection preceded by appropriate vascular ligation became possible, and it was less than two decades ago that the first hepatic resections were performed on this basis.^{6,7} In this way have evolved the present-day methods of segmental resection which include right hepatic lobectomy, extended right hepatic lobectomy, left hepatic lobectomy, left lateral segmentectomy and left medial segmentectomy (or middle lobectomy).

SURVIVAL FIGURES

Until recent years the morbidity and mortality following major hepatic resections were high, and the long-term results especially for primary and secondary malignancy have been disappointing.⁸ The last decade, however, has produced a steady improvement in results, and at the present time planned hepatic resections form an important therapeutic procedure in a wide variety of conditions which include gross hepatic trauma, primary benign and malignant neoplasms, carcinoma of the gallbladder selected cases of secondary hepatic malignancies, hydatid disease and some cases of haemobilia and hepatic arterial aneurysm. Present-day operative mortality average about 14%⁹ and is less than 10% in a number of series.^{10,11}

Over-all survival figures for patients undergoing hepatic resection for primary and secondary malignancy are at

first glance disappointing, but when considered in conjunction with the prognosis of untreated cases it becomes obvious that a worth-while salvage rate is being achieved. The best results have been reported in the resection of primary hepatoma in the non-cirrhotic liver in adults. In the series of Lin¹² the over-all resectability rate was 46.1% with an operative mortality of 11.9% and a 5-year cure rate of 21.4%. While the indications for hepatic resection in metastatic liver disease are still controversial, some encouragement is available in a review of the literature by Flanagan and Foster¹³ who were able to collect 72 patients who had undergone hepatic resections for metastatic malignancy (excluding carcinoid tumour). The corrected 2-year and 5-year survival figures were 51% and 24% respectively.

IMPROVED DIAGNOSIS AND TECHNIQUE

Many factors have combined to account for the steady improvement in results. Paramount among these have been improved diagnostic methods allowing the earlier diagnosis of hepatic malignancy and a more precise assessment of the extent of involvement. These include liver scanning using either ultrasound or isotopic techniques,¹⁴ portal venography,¹⁵ hepatic arteriography,¹⁶ hepatic venography and cavography,^{17,18} serum enzyme estimations, needle biopsy, peritoneoscopy and feto-protein estimation in the case of primary hepatoma.¹⁹

Experience over recent years has indicated the importance of careful patient selection and pre-operative preparation. The presence of impaired hepatocellular function as evidenced by hypoalbuminaemia, a persistently low prothrombin index and to a lesser extent by hyperbilirubinaemia is generally regarded as a contraindication to major resection. Similarly, most authorities agree that lobectomy for hepatoma arising in the cirrhotic liver is rarely indicated, both because of the aggressive natural history and multicentricity of this tumour in the cirrhotic,^{20,21} and because of the limited regenerative capacity exhibited by the human cirrhotic liver following resection.²²

Improvements in operative technique continue to evolve. Adequate exposure and vascular isolation before parenchymal division are essential. An increasing awareness of anatomical vascular anomalies and the avoidance of even temporary ischaemia of the hepatic remnant combined with an anaesthetic technique which stringently guards against intra-operative hypoxia and hypotension while maintaining a high blood glucose level, has done much to ensure good function of the remaining liver in the critical early postoperative period. Haemostasis of the cut surface of the liver remains a problem. Many surgeons now favour the finger fracture method of parenchymal division as resulting in the least blood loss.²³ Recently, the use of a

continuous wave carbon dioxide laser has been described for haemostasis, and early experimental results are promising.²³ Cryosurgical techniques and tissue adhesives may also fulfil a role in this respect in the future. Adequate drainage of the cut surface is mandatory. In addition, T-tube drainage of the common bile duct has received almost universal acceptance although recently doubt has been cast on the necessity for this.²⁴ This has, however, proved useful in allowing operative cholangiography and methylene blue injection to detect unsuspected biliary leaks from the cut surface.

A significant advance has been the better understanding and correction of the frequently encountered coagulation disorders associated with massive hepatic resection. These disorders are multifactorial and involve deficiencies in many of the liver-produced coagulation factors, activation of the fibrinolytic system, consumptive coagulopathy, thrombocytopenia and additional coagulation disturbances associated with massive blood transfusion.²⁴⁻²⁶

A great deal has been learnt regarding the disordered hepatic function following massive resections of up to 80% of the liver, and which, if uncorrected, can prove fatal.^{22,27,28} In particular, postoperative hypoglycaemia and a precipitous fall in the serum albumin require intensive replacement therapy in the first postoperative week. Studies of hepatic regeneration have stressed the remarkable regenerative powers of the human liver, and that up to 90% resection can be accomplished with morphological and functional regeneration within 6 months.^{29,30}

Thus there seems little doubt that the future will see an increased application of resectional hepatic surgery with a steady improvement on the results already being achieved.

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