To freeze or not to freeze

Réal Lapointe, MD, FRCSC

To date, surgical resection is the only treatment that can offer long-term survival rates, ranging from 25% to 40%,[1,2] for hepatocellular carcinoma and liver metastases mainly from colorectal cancer. However, this therapy can be offered only to a minority of patients, because of the number and location of lesions and limited hepatic reserve. Therefore, several other therapeutic modalities have been proposed for unresectable liver tumours, including systemic or intra-arterial chemotherapy, intra-arterial chemoembolization, percutaneous ethanol injection and even liver transplantation. The results of these have been variable.

Cryosurgery has emerged over the last decade as an alternative for unresectable liver tumours as having some promise.[3] Hepatic cryosurgery destroys each lesion in situ by direct 15-minute application of liquid nitrogen at –196 °C through probes of different diameters. This is followed by a 10-minute thaw period and a second 15-minute freeze. Continuous intraoperative ultrasonography is mandatory for mapping the lesions, helping probe placement and controlling the extent of the freezing process.[4] The acceptable size of the cryolesion (or ice ball) must be at least 1 cm larger than the apparent ultrasonic size of the metastasis.

In this issue of the Journal (pages 401 to 406), McKinnon and colleagues report their preliminary experience with cryosurgery for different malignant tumours of the liver. Among their 11 patients, 6 had metastases from colorectal cancer, 2 had neuroendocrine metastases and 1 had hepatocellular carcinoma. The criteria for eligibility, as noted by McKinnon and colleagues and Morris and Ross,[5] are extremely important. These highly selected 11 patients underwent 13 procedures, 2 of which were combined with resection. The surgeon's final decision on whether to resect only, to use cryosurgery only or a combination of the two is made at the moment of laparotomy.

The surprisingly long operating time in McKinnon's study could be explained by the learning curve of this new procedure, difficult mobilization of the liver due to previous hepatic resection and the number of cryodestroyed lesions. Even if some patients did not receive a blood transfusion, the average blood loss of 735 mL must be underlined. This blood loss seems to be related to the lesion to be frozen; a lesion at the liver surface has a greater tendency to bleed than one deep in the liver parenchyma. As the capsule thaws, it can crack, leaving stellate fractures that can lead to troublesome bleeding. Although McKinnon and colleagues had no perioperative deaths, Weaver, Atkinson and Zemel[4] reported a 4% death rate because of multisystem organ failure with irreversible coagulopathies. The death rate is the same as with major hepatic resections. Postoperative complications include liver abscess, biliary fistula, renal failure and postoperative hemorrhage.

As McKinnon and colleagues note, the different tumour types in their small series and the relatively short follow-up do not allow conclusions to be drawn with respect to survival. In the Australian experience of Morris and Ross,[5] the 3-year survival rate for colorectal metastases treated by cryosurgery was about 5%. Although this study reports recurrence of the hepatic lesions in most patients, the Australian experience has shown that recurrence is more common in extrahepatic sites such as the lungs and bone. This may reflect a change in the natural history of the disease.

In conclusion, cryosurgery of the liver is an evolving technique among the current therapeutic modalities available for unresectable liver tumours. Functional hepatic neuroendocrine metastases unresponsive to optimal medical treatments should be regarded as an indication for cryosurgery, with an important palliative benefit, as shown in the series of McKinnon and colleagues. As we gain more experience with hepatic cryosurgery of colorectal metastases from different centres,[6] many issues have been resolved. However, more remain to be answered. Among these issues are the more accu-

From the Department of Surgery, Hôpital Saint-Luc, Montreal, Que.

Correspondence to: *Dr. Réal Lapointe, Chef du service de chirurgie hépatobiliaire et pancréatique, Hôpital Saint-Luc, 1058, rue Saint-Denis, Montréal (Québec) H2X 3J4*

rate monitoring of the freeze, the adequacy of complete destruction of the lesion, the role of adjuvant intra-arterial chemotherapy, the place of laparoscopic cryosurgery[7] and the improvement of survival in patients with many metastases. Only the future will tell us the exact place of cryosurgery in patients with unresectable malignant tumours of the liver.

References

1. Nagasue N, Kohno H, Chang YC, Tamoira J, Yamanoi A, Uchida M, et al. Liver resection for hepatocellular carcinoma. Results of 229 consecutive patients during 11 years. *Ann Surg* 1993;217:375-84.
2. Adson MA. Resection of liver metastases — when is it worthwhile? *World J Surg* 1987;11:511-20.
3. Ravikumar TS, Kane R, Cady B, Jenkins R, Clouse M, Steele G Jr. A 5-year study of cryosurgery in the treatment of liver tumors. *Arch Surg* 1991;126:1520-4.
4. Weaver ML, Atkinson D, Zemel R. Hepatic cryosurgery in treating colorectal metastases. *Cancer* 1995;76: 210-4.
5. Morris DL, Ross WB. Australian experience of cryoablation of liver tumors. *Surg Oncol Clin North Am* 1996;5:391-7.
6. Shafir M, Shapiro R, Sung M,Warner R, Sicular A, Klipfel A. Cryoablation of unresectable malignant liver tumors. *Am J Surg* 1996;171:27-31.
7. Cuschieri A, Crosthwaite G, Shimi S, Pietrabissa A, Joypaul V, Tair I, et al. Hepatic cryotherapy for liver tumors. Development and clinical evaluation of the high-efficiency insulated multineedle probe system for open and laparoscopic use. *Surg Endosc* 1995; 9:483-9.

Devolution of hip and knee replacement surgery?

James P. Waddell, MD, FRCSC*

In this issue of the Journal (pages 373 to 378), Coyte, Young and Williams explore the controversial and somewhat frightening concept of mandated change in practice patterns, based on a combination of statistical analysis of past behaviour by hospitals and physicians and on projections for the future of population demographic characteristics.

Orthopedic surgery, especially elective joint replacement, is an appropriate area for such analysis to begin. The almost unique combination in a rapidly expanding population group (the aging population) of a non-life-threatening illness, with a high degree of disability that can be treated successfully by surgery, and the high resource intensity and cost of the surgical solution (implantable prosthetic devices) has led to scrutiny of the current practice of total joint replacement. While patient demand for a surgical solution to the pain and disability of arthritis is accelerating, provincially funded health care systems are being rigidly controlled through limited public funding.

In recent years, as hospital budgets increasingly came under constraint, cost-accounting systems in most hospitals were inadequate to capture the cost of providing medical care. The only effective cost-accounting measure was to look at invoices received. Thus, high-invoice items became targets for expenditure control. Because of the high cost of implantable devices for the treatment of degenerative joint disease, joint replacements were frequently curtailed in community and teaching hospitals. Because of poor access in community hospitals for patients requiring joint replacement, due to long waiting lists and "implant quotas" for surgeons working in those hospitals, primary physicians began re-

Director, Trauma Service, St. Michael's Hospital, University of Toronto, Toronto, Ont. Member, Editorial Board Canadian Journal of Surgery

Correspondence to: *Dr. James P. Waddell, Suite 800, 55 Queen St. E, Toronto ON M5C 1R6*