Laparoscopic Inguinal Hernia Repair Complicates Future Pelvic Oncologic Surgery

To the Editor:

We read with interest the article by Drs. Nathan and Pappas tracing the evolution of inguinal hernia repair from the first open tissue-based repairs, to the advent of mesh prosthetics, which ushered in tension-free repairs. Most recently, laparoscopic inguinal hernia repairs (LIHRs) have evolved, promising less postoperative pain and quicker return to work. The authors expressed some reservations over the newer laparoscopic techniques, citing their higher cost and higher recurrence rates in the early phase of the learning curve.[1] We are also approaching this operation with a renewed sense of caution, but for slightly different reasons.

Recent studies have shown that LIHR complicates, if not contraindicates, subsequent radical retropubic prostatectomy because of the fibrotic obliteration of the space of Retzius.[2] Moreover, since many men undergoing herniorrhaphy are younger than is usually considered for screening, there is the potential for significant numbers of men to have an LIHR prior to suspicion of prostate cancer. This may prevent their ability to undergo curative surgical therapy in the future when their cancer becomes clinically evident.[3]

To explore the clinical implications, we conducted a prospective study on 137 consecutive male patients presenting for LIHR at the Cleveland Clinic Foundation. Our series detected either prostate cancer or high-grade prostatatic intraepithelial neoplasia, a reputed precursor to cancer, in 4.9% of candidates for LIHR.[4] In all of these cases, the prostate cancer was managed before patients underwent a hernia repair. For these reasons, we recommend prostate cancer screening in all men over the age of 30 who are being considered for LIHR. This screening should consist of a digital rectal examination and serum PSA.

Furthermore, we recently encountered a case of muscle-invasive bladder cancer in a patient who had already undergone bilateral laparoscopic hernia repair. The mesh had become integrated into detrusor muscle, requiring that the bladder be shaved away from mesh, removing a segment of the mesh in the process. As seen with a radical prostatectomy performed after LIHR, dense inflammation and fibrotic reaction had essentially obliterated the space of Retzius. The cystoprostatectomy was completed without injury to other structures; however, nerve sparing was not possible. Furthermore, as the bladder was physically attached to the mesh, the risks of incomplete tumor removal, bladder perforation, or tumor spillage were heightened. Given that transitional cell carcinoma of the bladder has been known to spread by seeding, as in the case of perforation or tumor spillage, the mesh could have seriously compromised the patient's chance for cure. Since extirpative therapy is usually required for invasive bladder cancer, the obliteration of the preperitoneal space may be more significant in this setting than it is for patients with prostate cancer. We are currently evaluating the implementation of a screening program for LIHR candidates at higher risk for bladder cancer, notably long-term smokers.

The authors have proposed that ongoing studies will be needed to be define the cost-effectiveness and long-term recurrence rates of LIHR and thereby determine its role "in the armamentarium of the inguinal hernia surgeon." The potentially significant sequelae of LIHR on future pelvic surgery also needs to be seriously considered. Mesh for LIHR could compromise a pelvic oncologic operation and would certainly make any extirpative surgery difficult, if not impossible.

We would like to suggest the concept that for those patients at risk for developing muscle-invasive bladder cancer, a screening program be implemented prior to proceeding with an LIHR. At minimum, these patients need to be counseled that laparoscopic hernia repair can complicate any future pelvic surgery.

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In Reply:

We read with interest the letter to the editor by Dr. Hsia et al concerning inguinal hernia repair and preoperative urologic considerations. We have several comments in response. First, we agree that every male undergoing hernia repair should have a careful history and physical examination specifically directed at the genitourinary system. This is critical for any type of groin hernia repair, be it mesh, preperitoneal, or otherwise. This has always been the standard of care, since untreated bladder outlet obstructions are a common cause of hernia recurrence.

The case noted in the above letter describing mesh invasion into the bladder is quite rare, as the typical preperitoneal repair (open or laparoscopic) fixes the mesh to the pubic tubercle, but no further medially. The compli-

cation described above with mesh integration into the detrusor muscle is likely due to a Stoppa type of repair for bilateral hernias in which the mesh is placed across the entire preperitoneal space covering both hernia defects and crossing the midline. These repairs are very uncommon.

The Lichtenstein repair, which places mesh in the inguinal canal, complicates other operations not referred to in the above letter. Infrainguinal and suprainguinal approaches to the femoral and iliac arteries and veins are difficult after mesh repair of an inguinal hernia. These difficulties must be considered in patients with indwelling mesh undergoing vascular reconstructions. In summary, we agree with the notion that all men undergoing preperitoneal (open or laparoscopic) mesh repair of inguinal hernias be evaluated for genitourinary disease prior to surgery.

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Liver Transplantation for Hepatocellular Carcinoma: Need for a New Patient Selection Strategy

To the Editor:

In the February issue of *Annals of Surgery*, Cillo et al reported on the use of orthotopic liver transplantation (OLT) for the treatment of moderately or well-differentiated hepatocellular carcinoma (HCC). As noted by the authors, most transplant centers and the United Network for Organ Sharing have adopted the "Milan criteria" as initially proposed by Mazzaferro et al[1]; however, the authors suggest that preoperative tumor grade may be a more accurate criterion for selecting HCC patients for OLT. Using a selection protocol based on grade, Cillo et al reported that G1 and G2 HCC had an extremely low rate of tumor recurrence after OLT, comparable with that of incidentally detected HCC. Although we agree that tumor grade bears strongly on prognosis, we believe that the relative importance of tumor grade may have been overstated in the Cillo et al article. In the article, patients were highly selected not only with regard to tumor grade but also tumor size (median tumor size, 2.5 cm). Although the authors attribute their low incidence of microscopic vascular invasion (MVI) (4%) to the fact that only G1-G2 HCC were considered for OLT, small tumor size and perhaps other factors (selection of better biology based on waiting time on transplant list) could also explain the unexpectedly low incidence of MVI.[2]

The interaction of tumor size, nuclear grade, and MVI is complex and these factors are known to compete in multivariate models with regard to prognosis.[3–5] Hemming et al have reported that although vascular invasion, tumor size greater than 5 cm, and poor tumor grade were significant predictors of tumor recurrence by univariate analysis, only vascular invasion remained significant on multivariate analysis.[3] Jonas et al reported that tumor diameter in correlation with histopathologic grading was predictive of vascular invasion but only in HCCs larger than 5 cm.[4] Because of the exceedingly low incidence of both MVI and large tumors in the report by Cillo et al, it is impossible to assess the impact of each of these factors on tumor grade in this study.

Based on our own experience with HCC patients in the International Cooperative Study Group on Hepatocellular Carcinoma,[6] we would have expected a significantly higher incidence of MVI than the 4% reported by Cillo et al. Of the 591 HCC patients in our multicenter database, 23.9% and 50.8% of G1 and G2 patients, respectively, had MVI well over the rate reported by Cillo et al. Patients with G1 and G2 tumors < 5 cm had a 16.7% and 30.0% rate of MVI, respectively. As expected, G1 and G2 patients with tumors ≥ 5 cm had even higher rates of MVI (32.3% and 67.9%, respectively) (Fig. 1). The relative high incidence of MVI in G1 and G2 patients in our experience makes us question the general applicability of the Cillo et al findings. Although their work corroborates earlier findings that low tumor grade leads to a good prognosis in pa-

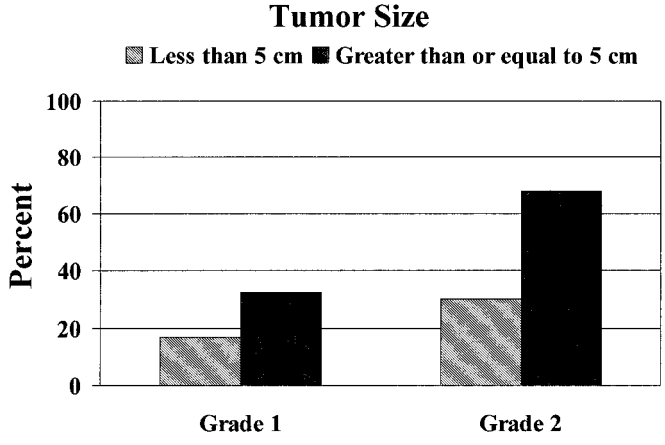

FIGURE 1. Of the 591 HCC patients in the International Cooperative Study Group multicenter database, 23.9% and 50.8% of GJ and G2 patients, respectively, had microvascular invasion on final surgical pathology. Patients with smaller tumors (< 5 cm) were less likely to have microvascular invasion (G1, 16.7%; G2, 30.0%) than patients with larger tumors (≥ 5 cm) (G1, 32.3%; G2, 67.9%).

tients with small tumors and no MVI, it fails to answer the more difficult question of how patients with low-grade, larger tumors with or without MVI fare after OLT.

We agree with the authors that fine needle aspiration biopsy may in the future be helpful in preoperatively stratifying patients with regard to biology of HCC,[7] but we believe it is premature to state that grade is the main factor that influences prognosis after OLT. Future investigations will need to include patients with a broader range of tumor sizes, degree of vascular invasion, as well as grade to clarify which factor, or combination of factors, has the most prognostic power in predicting outcome after OLT for HCC.

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In Reply:

As observed by Pawlik et al, our group of patients with preoperatively known HCC was characterized by a relatively low prevalence of tumors > 5 cm (18%). Accordingly, among the 93 patients with unresectable HCC excluded by the transplantation program at our Center, a considerable proportion (42%) had at least one nodule > 5 cm, although nodule size and number were not considered as absolute exclusion criteria.[1] However, it is easily understandable how a patient selection policy based on features related to biologic aggressiveness of the tumor may strongly influence the prevalence of large HCC both in the transplanted and in the excluded group of patients. Indeed, a significant body of evidence has shown the tight relation between grading and nodule size.[2] Our selection process, therefore, has led indirectly to exclude the great majority of large HCC, giving more strength to the clinical performance of the exclusion criteria we adopted (poorly differentiated tumor, macroscopic vascular and/or extrahepatic metastases, general contraindication). A similar phenomenon in patient selection before transplantation has been recently described in a Japanese paper[3] focused on living donor liver transplantation for HCC. In this study, although only HCC with vascular invasion or extrahepatic metastasis were excluded (independently from tumor size, number, and grade), the percentage of transplanted tumors > 5 cm was the same of our study (18%), and 5 of 6 HCC recurrences were poorly differentiated tumors with microscopic vascular invasion (MVI). Moreover, the nodule size in this as in our study was unable to predict HCC recurrence. Indeed, although low in number (18%), none of our patients transplanted with large HCC experienced posttransplantation tumor recurrence. We substantially disagree with Pawlik et al on the potential in our study for a significant selection of better biology on waiting time on transplant list since we observed an extremely low prevalence of dropout in list for tumor progression (3%).

As far as MVI is concerned, the selection process may partially justify the very low incidence of this microscopic feature in our study. In this view, it has to be underlined that in the Mazzaferro's paper defining the "Milan criteria" MVI prevalence resulted even lower (0%).[4] It is difficult to explain, however, how in other studies[2,5–7] even G1–G2 tumors < 5 cm have significantly higher rates of MVI (17%–30%). The more likely explanation lies, we believe, in the retrospective nature of these studies. A MVI-targeted pathologic revision of surgical specimens, indeed, could bring to find higher rates of MIV due to the scrupulous retrospective histologic examination of the explanted liver when compared with that observed in prospective studies. On the other hand, the hypothesis of a underestimation of MVI prevalence in our study would further confirm the independent prognostic power of the histologic grade in predicting HCC recurrences as already shown by other authors.[8,9]

Independently from size and MVI, it is important not to miss that the main incontrovertible result of our study is that 40% of our patients underwent OLT despite not meeting the Milan criteria, but none of them had HCC recurrence. The main risk of using the United Network for Organ Sharing criteria is indeed to unfairly exclude from OLT a considerable proportion of patients who could benefit from this option.[10,11] Such a recognized risk justifies the international scientific tendency to expand this enlisting limits.[12] On a speculative basis, an alternative way to solve the problem is to establish acceptable exclusion criteria from the waiting list because of tumor progression to secure a lowest assumed cut off value of expected 5-year survival. As suggested by Bruix et al,[13] this should be based on robust prospective studies derived from data obtained by preoperative diagnostic techiniques, not retrospective pathologic examination.

In the context of prelisting selection, Mazzaferro et al[4] and Bismuth et al[14] have undoubtedly represented cornerstone studies in the area of the indication process to transplantation for HCC patients, dramatically improving the long-term results after the transplant. However, 8 and 11 years after those experiences, there is the strong need to further refine such a selection strategy to improve the overall accuracy of the process, with particular reference to the risk of exclusion for those patients with a potential for cure.

In this context, the aim of our study was not to give definitive criteria for the selection (a larger scale multicentric controlled study is needed) but to suggest that there is today the concrete possibility to move on in this area toward an indication philosophy focused on less archaic tumor features, more directly expressing HCC biologic aggressiveness.

Waiting for further conformational studies, we strongly believe that patients with low-grade HCC not included in Milan criteria should be carefully evaluated before exclusion from transplant listing.

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Is Primary Resection and Salvage Transplantation for Hepatocellular Carcinoma a Reasonable Strategy?

To the Editor:

We read with great interest 2 recent articles published in *Annals of Surgery* on the results of secondary transplantation following hepatic resection from 2 French groups with different conclusions.[1,2] Adam et al[1] compared the results of secondary transplantation for tumor recurrence following resection of initially transplantable hepatocellular carcinoma (HCC) in 17 cirrhotic patients with results of primary transplantation in 195 patients. The study found that secondary transplantation resulted in a higher operative mortality, increased risk of recurrence, and poorer survival compared with primary transplantation. The authors concluded that the strategy of secondary transplantation following primary resection has a limited role in the management of cirrhotic patients with HCC. The group advocated primary liver transplantation as the treatment of choice for transplantable HCC in cirrhotic patients even when the tumor is also resectable. In contrast, Belghiti et al[2] found that the operative mortality, recurrence rate, and long-term survival among 18 patients with secondary transplantation for tumor recurrence, deterioration of liver function, or high risk of recurrence was comparable to that of 70 patients who underwent primary transplantation. The latter group concluded that liver resection prior to transplantation can be integrated in the treatment strategy for HCC. Both papers have been extensively discussed when they were presented in the Annual Meetings of the American Surgical Association and the European Surgical Association, respectively. We write to provide additional comments and perspective on the 2 studies that have not been covered in the Discussion session of the 2 papers.

In the paper by Adam et al,[1] the operative mortality was high (n = 4, 23.5%) among the 17 patients with secondary transplantation for recurrent HCC after previous hepatic resection, although the operative complication rate was similar between the 2 groups. Two of the deaths were caused by cardiac arrhythmia. It is not clear whether these 2 patients had preexisting cardiac disease. The comorbid illnesses of the 2 groups should have been compared to provide the readers with a clearer idea of the premorbid medical condition of the patients. There were 2 additional deaths from sepsis in the secondary transplan-

tation group. However, in the operative complications listed in Table 2, there was only 1 patient with sepsis in the secondary transplantation group. The authors attributed the high operative mortality in the secondary transplantation group to excessive intraoperative bleeding as evidenced by the higher number of units of packed cell (mean 16.7 units) transfused in this group. The exact blood loss in each group was not provided. The transfusion requirement even in the group of primary transplantation (mean 10.9 units) was quite high when compared with a mean transfusion of 3 units reported by Belghiti et al. In the latter study, the mean transfusion requirement of the secondary transplantation group was only 2 units. It would be more informative to know the exact blood loss in the study of Adam et al,[1] as blood transfusion policy may vary among institutions. Furthermore, there were discrepancies in the operative mortality rate and blood transfusion requirement reported in the abstract and the text of the paper, which need to be clarified. In the abstract, the operative mortality of secondary transplantation group was 28.6% instead of 23.5%, and the mean transfusion requirement was 20.7 units instead of 16.7 units as stated in the text. The corresponding *P* values were also different.

Of the greatest concern is the survival analysis in the study by Adam et al.[1] The authors reported that secondary transplantation resulted in worse posttransplant survival compared with primary transplantation, and the authors demonstrated that a previous liver resection was an independent adverse prognostic factor of posttransplant survival in the whole group of transplanted patients. However, as the purpose of the study was to evaluate the efficacy of a strategy of resection followed by salvage transplantation for recurrence, the survival from the time of initial hepatic resection instead of the survival after secondary transplantation should be used in both the survival comparison and multivariate analysis of prognostic factors. The posttransplant 5-year survival after secondary transplantation was 41% compared with 61% after primary transplantation ($P = 0.03$). The mean interval from diagnosis of HCC to liver transplantation in the former group was 23.6 months compared with 9.2 months in the latter group. The additional 14.4 months longer survival before transplantation in the secondary transplantation group, presumably at least in part gained from primary resection, would probably have made the difference in survival between the 2 groups not significant.

The feasibility of salvage transplantation depends on the transplantability of the recurrent tumors. In the study of Adam et al,[1] the transplantability of recurrent tumors after resection was only 23% (17 of 75), which was much lower than a transplantability rate of about 80% reported by our previous study and another group.[3,4] The exact reason for the discrepancy is uncertain. We speculate that it may be related to different patient populations, different intensity in postoperative surveillance, and difference in the selection criteria of the initial tumors included in the study. In both our previous study[3] and the study by Cha et al,[4] only patients with tumors that fulfill the Milan criteria[5] (solitary tumor $\leq$ 5 cm or 2 or 3 lesions each $\leq$ 3 cm) were included, whereas in the study of Adam et al,[1] tumors up to 6.5 cm were included. The exact transplantability rate of the recurrent tumors after hepatic resection in the study of Adam et al[1] was not clear. Of the 52 intrahepatic recurrences in the resection group, 20 were not transplantable because of multinodular tumors ($>$ 3 nodules), and 17 patients were actually transplanted. Whether the other 15 patients were not transplantable by criteria or transplantable but not actually transplanted was not clearly indicated. If these 15 patients were included, the transplantability rate should be 43% instead of 23%. The proportion of patients with extrahepatic recurrence (23%) was rather high in the group of resected HCC, even though the initial tumors were presumably transplantable. It would be more informative if pathologic data of the tumors such as vascular invasion and the presence of intrahepatic metastasis have been provided and compared between the resection group and the transplantation group in addition to tumor size and number of tumor nodules. Even though the tumor size was similar between the 2 groups, there could be a theoretical difference in the biologic aggressiveness of the tumors as the group with primary transplantation represented a group of patients with probably more slow growing tumors naturally selected after a period of waiting for the graft.

Adam et al[1] further performed an "intention-to-treat analysis" to compare the results of 98 patients with primary resection with or without secondary transplantation and those of 195 patients with primary transplantation. They showed that the survival results of the former group were significantly worse than that of the latter group, and liver resection was found to be a negative independent prognostic factor of survival in a multivariate analysis that included both groups of patients. However, the term "intention-to-treat analysis" is somewhat misleading because a truly "intention-to-treat analysis" should include all patients initially listed for either resection or primary transplantation. A previous study by the Barcelona group has reported a high "drop-out" rate in patients with HCC listed for transplantation because of unavailability of grafts and progression of the tumor.[6] In that study, 5-year survival was equivalent after resection or transplantation with a truly intention-to-treat analysis, even though many of the patients in the resection group exceeded the eligibility criteria for transplantation. For patients with HCC eligible for either resection or transplantation, the strategy of primary resection has the obvious advantage that the patients do not have to risk the possibility of drop-out from the treatment due to tumor progression while wait-

ing for a graft. The problem of graft shortage has to be taken into consideration when advocating a strategy of primary transplantation for resectable HCC. Adam et al[1] suggested the use of live donor transplantation to increase the availability of grafts for primary transplantation for otherwise resectable HCC. However, in our experience, a live donor is not available for a substantial proportion of patients for variable reasons. A more important concern is the potential morbidity and mortality of the liver donor.[7] Compared with the scenario of live donor transplantation for a patient with a small HCC associated with Child-Pugh class C cirrhosis who has otherwise no effective treatment option available, it is more arguable whether it is ethical to risk a healthy donor when there is an alternative option of resection with comparable long-term overall survival result. In this context, a strategy of primary resection followed by salvage transplantation seems more reasonable provided that the transplantability of recurrent tumors is high and the survival result after salvage transplantation is reasonable.

Belghiti et al[2] presented data supporting the strategy of resection followed by transplantation. The perioperative outcome of the secondary transplantation group was favorable, with a mean blood loss of 1282 mL and a 30-day mortality of 5.6%, although this group of patients required more reoperation than patients with primary transplantation. The most important finding was that the 2 groups of patients had similar posttransplant overall and disease-free survival. Indeed, if the mean interval of 20 months from the time of resection to listing for transplantation was included in the secondary transplantation group, the overall survival from the time of initial surgical treatment in this group would have been better than that of the primary transplantation group. Of course, an "intention-to-treat" comparison of the survival outcome of all patients with transplantable HCC who were listed for resection and those who were listed for transplantation had to be performed to provide an overall picture of the survival benefit of each strategy. The favorable outcome of the secondarily transplanted patients may be related to patient selection. The histopathologic features of the tumors were not reported in this study. It would be interesting to look at the biologic aggressiveness of the recurrent tumors in comparison to the tumors in the primary transplantation group.

The exact reasons for the different outcomes in long-term posttransplant survival in the secondarily transplanted group between the 2 studies were not clear. The 5-year overall survival of the primary transplantation group in both studies was about 60%, which was comparable to the survival rates after hepatic resection of transplantable HCC reported in 2 other studies.[3,4] It is noteworthy that there was a difference in the inclusion criteria of transplantation in the 2 French studies. Belghiti et al[2] used the widely accepted Milan criteria, whereas the criteria of Adam et al[1] were extended to include tumors up to 6.5 cm in diameter. The difference in selection criteria was reflected by the smaller tumor size in both groups of secondary transplantation (mean 2.3 vs. 3.4 cm) and primary transplantation (mean 2.2 vs. 3.7 cm) in the former study. The survival outcome after transplantation for HCC is influenced by the biologic aggressiveness of the tumors, and this underscores the importance of providing pathologic features of the tumors such as microscopic venous invasion for better interpretation of the different outcomes of the studies. Another difference that may have accounted for the different survival outcomes is that in the secondary transplantation group of the study by Belghiti et al,[2] 4 patients transplanted for deterioration of liver function and 3 patients transplanted *de principe* without evidence of tumor recurrence were included in the survival analysis; whereas in the study of Adam et al,[1] only patients with secondary transplantation for tumor recurrence were included in the survival analysis. It is interesting to note that Belghiti et al[2] have extended the indication of salvage transplantation to not only those with tumor recurrence or deterioration of liver function as proposed in our previous study,[3] but also those considered at high risk of recurrence due to positive margin or satellite nodules. The exact role of *de principe* salvage transplantation for such cases may become another subject of debate.

We hope our comments may be helpful to the readers in drawing their inferences on the role of the strategy of salvage transplantation following hepatic resection when they read these 2 papers with contrasting results. Despite the above caveats regarding the studies, we applaud the 2 French groups for providing very important data on the results of secondary transplantation after primary resection of HCC, which will certainly initiate an ongoing debate regarding the role of such a strategy in the coming few years. In our institution, we consider resection as the treatment of choice for small HCC associated with Child's A cirrhosis, and we reserve salvage transplantation for selected patients with tumor recurrence or deterioration of liver function. Severe graft shortage is an important limiting factor in our locality in performing transplantation for HCC. At the time of writing, our center has performed salvage transplantation after previous hepatic resection for HCC in 16 patients, 3 using cadaveric grafts, and 13 using live donor liver grafts, without operative or hospital mortality. The follow-up duration was too short for an analysis of the long-term survival results. The optimum strategy for the treatment of cirrhotic patients with HCCs that are eligible for both resection and transplantation is an important issue in the management of HCC, and the role of transplantation for HCC in general is also continuously evolving. We hope further data from our group and other groups will be available soon to help clarify this issue, and we also look forward to reading further studies from the 2 French groups on this subject.

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Reply:

We would like to thank Dr. Poon for his thoughtful comments on our manuscript, as his results have pioneered our work. He has, at the Queen Mary Hospital, Hong Kong, shown that liver resections could currently be associated with reduced risk and a much better survival than previously thought.[1] With this background, he has most importantly opened the concept that resection and transplantation could be associated rather than opposed, as was initially the case and introduced the concept of resection as a bridge to transplantation.

We would like to insist on this timely concept as the liver transplantation waiting time for HCC patients continues to increase in our country. Although percutaneous ablation initially appeared as the ideal bridge treatment in these patients, our experience and that of others is that it is neither always possible nor fully effective. This is, in particular, the case for tumors located in the upper part of the right liver. These, in contrast, can be easily and completely removed through a thoracic incision.[2] The laparoscopic approach is another modern mean of removing superficial tumors that some radiologists also fear to approach percutaneously. Liver transplantation, if required, is clearly not impaired by such previous operations.

We also would like to take the opportunity of Dr. Poon's comment to insist on the selection that allows such previous resections. Although the so-called Milan criteria have considerably improved the selection of transplant candidates to a point that they are now an integral part of the allocation system in the United States, they still are widely considered as perfectible. On the one hand, they are too wide as 15% to 30% of the patients prove to be outside these criteria with vascular invasion on the resected specimen. On the other hand, they are also considered as too restrictive as several groups have recently extended the size criteria without apparently markedly altering the long-term outcome. Markers other than size and number have recently emerged as significant prognostic variables, such as the presence of satellite nodules,[3] differentiation,[4] or the genetic profiling of the tumor.[5] These, however, can only be fully ascertained upon the complete examination of the resected specimen. Resection prior to transplantation appears as a good way to optimize the treatment option.

This strategy, which combines resection and transplantation, opens a completely new field of investigation and will certainly evolve with time. We are currently speeding up the transplantation process if markers of early recurrence are present in the resected specimen, whereas we tend to consider resection as the first line treatment in their absence and perform transplantation as salvage once recurrence occurs as suggested by Dr Poon's previous work. This latter option has been shown not to be associated with a loss of chance in HBV patients (who are the most frequent in Hong Kong) and we are currently investigating whether the same holds true in HCV patients (who predominate in the West and Japan).

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