AUDIT ARTICLE

Is it necessary to measure hepatic venous pressure gradient before liver resection in cirrhotic patients? A single center audit

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Abstract

Objective: To determine whether routine preoperative hepatic venous pressure gradient measurements are necessary in child's-A cirrhotic patients undergoing liver resection for hepatocellular carcinoma, and to assess immediate post-operative liver dysfunction and 30-day mortality in such cases.

Methods: The 3-year audit was done at Shuakat Khanum Memorial Cancer Hospital and Research Centre, Lahore, Pakistan, and comprised data from January 1, 2015, to December 31, 2017, of all Child's class "A" patients with hepatocellular carcinoma without any clinical signs of portal hypertension who had preoperative hepatic venous pressure gradient measurements done. A proforma was used to collect the required data from patient files. Data was analysed using SPSS 21.

Results: Of the 20 patients, 11(55%) were males. The overall mean age was 60.6±7.4 years. Only 2(10%) patients had raised hepatic venous pressure gradient. Of the total, 14(70%) patients underwent surgery. Mean duration of surgery was 222±82.5 minutes and mean hospital stay was 6.8±3.2 days. None of the patients had deranged prothrombin-time or bilirubin on postoperative day 5.

Conclusion: The incidence of subclinical portal hypertension was very low. Hepatic venous pressure gradient measurement can be avoided in early stage hepatocellular carcinoma for child's A cirrhotic patients undergoing liver resection.

Keywords: Portal hypertension, Hepatic venous pressure gradient, Invasive monitoring. (JPMA 71: 489; 2021)

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Introduction

Portal hypertension (PHT) is a major complication of chronic liver disease. In cirrhotic patients, it can lead to major complications, such as variceal bleeding, ascites and hepatic encephalopathy.[1] Hepatocellular carcinoma (HCC) is usually associated with underlying liver cirrhosis. The choice of treatment for HCC in patients with normal liver function or well-compensated cirrhosis is liver transplant or surgical resection. However, literature suggests that only 5-40% patients with HCC are suitable for curative treatment at the time of diagnosis.[2] Due to unavailability of donors and a specialised transplant setup, especially in the developing countries, there has been an ongoing controversy about which is the most suitable treatment option for patients with early stage HCC: liver transplant or surgical resection?[3] Overall, the unavailability or delay in transplant may worsen the cirrhosis, along with tumour progression and the patient may end up in palliative treatment options like transarterial chemoembolisation (TACE). So surgical resection may seem invasive and more morbid, but that may be the only curative for a large number of early HCC patients in developing countries. Local ablative therapies are considered the other best alternative for such patients. However, the benefits of radiofrequency ablation (RFA) are limited in tumours >3cm and tumours located near diaphragm, gallbladder or adjacent to a major vessel.[2]

Compared to liver resections in otherwise healthy patients, hepatectomy in patients with PHT is associated with significantly increased postoperative morbidity reported up to 22-50%.[4,5] A thorough pre-operative risk evaluation and assessment for the presence of clinically significant PHT is highly recommended in patients with HCC. PHT can be assessed by clinical non-invasive criteria or by the measurement of portal venous pressure which is the invasive hepatic venous pressure gradient (HVPG) measurement. Clinical criteria include the presence of oesophageal varices, splenomegaly or thrombocytopenia. On the other hand, direct portal venous pressure measurement is highly invasive and cannot be routinely performed. As an alternative, HVPG has been widely accepted as a measurement for portal venous pressure.[6] HVPG actually represents the gradient between the portal vein and the hepatic vein. Patients having HVPG >10 are considered having clinically significant PHT and are at high risk for surgical complications or liver failure.[7] Despite its reliability and advantages, the technique for HVPG is not only expensive, but is invasive and associated with complications, such as injury at cannulation site, leakage, haematoma formation and vagal reactions, rupture of venous introducers and arteriovenous (AV) fistula formation and transient arrhythmias.[6,8]

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The role of preoperative invasive assessment of HVPG in patients with HCC remains to be determined. Recent literature suggests that HVPG >10mmHg is associated with an increased postoperative complications and it should be measured routinely in patients with resectable HCC.[9] However, the European Association for the Study of the Liver (EASL)[10] and the American Association for the Study of Liver Diseases (AASLD)[11] suggest that clinical parameters can be used as an alternative to HVPG in determining the presence of clinically relevant PHT in pre-operative assessment.

The current study was planned to determine whether routine preoperative HVPG measurements are necessary in child's A cirrhotic patients undergoing liver resection for HCC with no clinical or radiological evidence of PHT. It was also planned to evaluate immediate post-operative liver dysfunction and 30-day mortality in such patients.

Patients and Methods

The 3-year audit was done at Shuakat Khanum Memorial Cancer Hospital and Research Centre, Lahore, Pakistan, and comprised data from January 1, 2015, to December 31, 2017. Exemption from the institutional ethics review board was granted in June 2018. All child's A cirrhotic patients with HCC who had preoperative HVPG measurements were included. Patients with clinical or radiological signs of PHT or with child's B/C cirrhosis were excluded.

The procedure had been performed in line with literature.[6] After applying local anaesthesia with 2% lidocaine and using aseptic technique, the right internal jugular vein was accessed under ultrasound guidance using micropuncture technique and a 5 Fr sheath was used. Next, 5 Fr angled catheter and guidewire were used to select the right hepatic vein under fluoroscopy guidance. The free hepatic venous pressure (FHVP) and the wedged hepatic venous pressure (WHVP) measurements were taken at the two sites and the average HVPG (WHVPG - FHVPG) was calculated. The catheter was then withdrawn and haemostasis was obtained by manual compression.[6]

A detailed proforma was used to collect data from patient files, including demographics, size and location of the lesion, pre-operative and post-operative haematological investigations. Post-operative liver dysfunction was assessed by using the '50–50' criteria on day 5; according to which if serum bilirubin was >50% of the normal value or prothrombin time (PT) was <50% of the normal value on post-operative day 5, it indicated liver dysfunction.[12]

Data was analysed using SPSS 21. Qualitative variables were expressed as frequencies and percentages. Quantitative variables were expressed as means and standard deviation (SD).

Results

Of the 20 patients, 11(55%) were males. The overall mean age was 60.6±7.4 years. Hepatitis C was the most common cause of cirrhosis 19(95%).Mean HVPG was 5.80±3.8mmHg, with only 2(10%) subjects having raised HVPG measurements. In 1(5%) patient, the reading was 15mmHg and in the other it was 13mmHg. Location of the tumour was in the right lobe in 16(80%) cases (Table 1).

Table-1: Demographics of the patients (n=20).

Variables	Overall n(%)
Mean Age (years)	60.6±7.4
Gender	
Female	09 (45)
Male	11 (55)
ASA Level	
III/IV	16 (80)
Cause of cirrhosis	
Hepatitis C	19 (95)
Hepatitis B	1 (5)
Location of the tumour	
Right lobe	16 (80)
Left lobe	4 (20)

ASA: American Society of Anesthesiologists; SD: Standard deviation.

Table-2: Surgical outcomes (n=20).

Variables	Overall n(%)
Duration of surgery, Mean±SD (min)	222.4±82.5
Blood loss, Mean±SD (mls)	460 ±411
Wound infection	1 (7.1%)
30-d mortality	0 (0%)
Hospital stay, Mean±SD (days)	6.8±3.2
Histopathology	
Well diff	10 (71.4%)
Moderately diff	3 (21.4%)
Poorly diff	1 (7.1%)

SD: Standard deviation.

Table-3: Haematological parameters for assessing liver function on postoperative day-5.

	PT (9-14)	TB (0.1-1.2)	Lactate	Albumin	INR	Platelets
1.	11	0.5	7.6	2.6	1.0	102
2.	11.4	0.8	8	2.8	1.1	118
3.	11.9	0.3	9.2	2.8	1.3	136
4.	12	1.0	14.9	2.7	1.1	141
5.	11.9	0.8	21.8	3	1.2	150
6.	13.7	0.5	24	3.1	1.1	161
7.	12.5	1.2	25	3.4	1.0	162
8.	12.8	0.9	24	3.8	1.1	163
9.	12.4	1.4	-	3.2	1.2	172
10.	14	1.6	14	2.9	1.0	252
11.	13.7	1.2	8	4.1	1.3	280
12.	12	0.8	-	3.9	1.1	105

PT: Prothrombin time, TB: Total bilirubin, INR: International normalised ratio

Of the total, 6(30%) patients did not undergo surgery; 2(10%) with HVPG >10, 2(10%) with uncontrolled co-morbidities, and 2(10%) refused any surgical intervention. As such, surgical outcome was assessed for 14(70%) patients who underwent surgery. Two (14.3%) patients had tumour progression and irresectable disease on exploration. The mean duration of surgery was 222.4±82.5 minutes. Mean intraoperative blood loss was 460±411 mls. Two (14.3%) patients had unresectable disease, and 1(7.14%) patient had post-operative wound infection. There was no 30-day mortality. Mean hospital stay was 6.8+3.2 days. Most of the patients 10(71.4%) had well-differentiated HCC on final histopathology (Table 2).

None of the patients had deranged serum bilirubin or PT on 5th post-operative day. Other parameters, including lactate, platelets and international normalised ratio (INR) also remained within normal range in the immediate postoperative period (Table 3).

Discussion

The significance of the HVPG in selecting patients with HCC for hepatectomy has been somewhat contentious. Clinical practice guidelines by EASL and AASLD recommend the use of clinical parameters as an alternative to HPVG.[10,11] A study[4] provided evidence that indirect measures of PHT may be reliable alternatives, or complements, for stratifying patients by risk of post-operative liver failure. HVPG measurement is invasive and expensive, and it requires experienced radiologists. In this case series, none of the patients who underwent pre-operative HVPG measurement, had any clinical sign of PHT. On measuring, only 10% patients had raised HVPG (>10mmHg), and to identify such patients with subclinical PHT, everyone had to go through an invasive procedure. However, none of the patients developed any immediate major complication related to liver resection. Post-operatively, all patients had normal liver synthetic functions, according to the 50-50 criteria of liver decompensation. The other haematological measures done on the 5th post-operative day for assessing liver functions also remained within normal range.

Previously, the effect of pre-operative HVPG measurement on post-operative morbidity and mortality was also investigated by comparing patients who had HVPG measurement with those who were assessed through clinical criteria and the surgeon's judgement regarding PHT. This comparison did not reveal a significant difference in the rate of post-operative complications.[13]

In clinical practice, HVPG measurement is a useful technique especially in cases of subclinical PHT where cirrhosis is not obvious on non-invasive techniques, such as computed tomography (CT) scan or ultrasound. However, in this study only two patients had subclinical PHT on HVPG measurement. Small sample size is the main limitation of the current study, and it was small because at diagnosis, most HCC patients were not found suitable for surgical resection.[2] Further studies may be able to better clarify the use of HVPG measurement before liver resection in cirrhotic patients.

Conclusion

The incidence of subclinical PHT was very low in the absence of clinical and radiological signs. HVPG measurement can be avoided in early stage HCC for child's A cirrhotic patients.

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