Original Article

Prospective comparative study between anterior approach and conventional approach right formal hepatic resection for large hepatocellular carcinoma

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ABSTRACT

Background: A study is carried out to assess the possible advantages of operative and postoperative outcomes of the anterior approach (AA) over the conventional approach (CA) in major right hepatectomy for large hepatocellular carcinoma (HCC).

Patients and Methods: A prospective randomized controlled study was performed on 50 patients who had a large (≥5 cm) right lobe of the liver HCC and underwent curative right formal hepatectomy during a 28-month period. The patients were randomized to undergo resection of the tumor using the anterior approach technique (AA group, n=25) or the conventional approach technique (CA group, n=25). The CA involves initial complete mobilization of the right liver followed by extrahepatic vascular control then hepatic parenchymatous dissection is performed. AA consists of initial vascular inflow control and parenchymal transection before mobilization of the right lobe.

Results: There was no significant difference between the two groups as regards clinical, laboratory, and pathological parameters. The operative results showed a significant blood loss in the CA group in comparison to the AA group. The AA group had better disease-free survival and overall survival than the CA group.

Conclusion: The anterior approach is the recommended technique for right formal hepatectomy for large HCC as it results in improved operative and survival outcomes of the patients.

Key Words: Anterior approach, conventional approach, hepatocellular carcinoma.

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INTRODUCTION

Worldwide, hepatocellular carcinoma (HCC) is the sixth most prevalent primary cancer[1]. According to research, 80–90% of primary liver cancers are caused by HCC[2]. The cornerstone of HCC treatment that may lead to a cure is still hepatic resection[3]. As the liver is a silent organ, most HCC patients have no symptoms at all. Because of this, most patients receive a diagnosis at an advanced stage, which makes surgical excision impractical. Less than 20% of HCC patients are thought to be qualified for liver resection at the time of diagnosis[4]. 60% of malignant tumors in the liver target the right lobe, the right lobe of the liver is known to have a high vascularity, complex anatomic structure, and a large physical volume. As a result, large tumors in the right liver lobe may cause a set of complications during their resection[5].

The literature has documented a variety of surgical techniques for right hepatectomy (RH), the most popular being the anterior approach (AA) and the conventional approach (CA), either with or without the hanging procedure. Lortat-Jacob and Robert[6] were the first to describe complete liver mobilization and extrahepatic vascular management prior to parenchymatous transaction for right hepatic resection. Hepatic surgeons view this procedure as the standard method for performing right hepatic resection[7].

However, improper right liver mobilization may result in iatrogenic tumor rupture, prolonged ischemia of the liver remnant from hepatoduodenal ligament rotation, excessive bleeding from avulsion of the hepatic veins, and cancer cell spillage into the systemic circulation. These events are major contributors to local recurrence and potential systemic dissemination of cancer cells[8,9]. Additionally, the right liver's rotation compresses the liver that will eventually remain, exacerbating parenchymal damage. This can also lead to hemodynamic instability via vena cava twisting. The anterior approach, first described by Lai and colleagues in 1996[8], could be used to get around all these problems.

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Prior to mobilizing the right lobe of the liver, this anterior transhepatic method entails controlling arterial inflow initially, finishing parenchymal transection, and controlling venous outflow completely[9]. Less intraoperative blood loss, fewer transfusion needs, shorter operating times, reduced hospital mortality, and improved disease-free survival (DFS) or overall survival (OS) after RH for HCC greater than or equal to 5 cm are some of the benefits of AA versus CA[10]. The branches of the main hepatic vein at the deeper parenchymal transection are challenging to control with the AA, though. Raising the possibility of serious vascular damage, particularly to the inferior vena cava and hepatic veins[11].

A controlled trials comparing AA to the CA revealed improved short- and long-term outcomes in large HCC greater than or equal to 5 cm[10]. While some believe that the anterior method can be a useful backup if problems arise during liver mobilization, others view the advantage of the CA being its ability to stop severe bleeding during liver transection. Prioritizing safety is crucial when choosing a surgical strategy[12].

Consequently, a prospective randomized trial is carried out to assess the possible advantages of the AA over the CA in major RH for large HCC.

PATIENTS AND METHODS:

Type of study

This was a prospective cohort study.

Study setting

This study was conducted at the hepatobiliary surgery unit at Ain Shams University Hospitals.

Study period

From January 2022 to April 2024.

Study population

Patients with HCC meet the following criteria:

Inclusion criteria

(a) Patients between the age of 18 years old and 70 years.

(b) Tumor size more than or equal to 5 cm and resectable.

(c) Patient child A only with no portal hypertension.

(d) Curative intent of resection.

Exclusion criteria

(a) Extrahepatic metastasis was not included even if the tumor was resected.

(b) Small right hepatocellular carcinoma (less than 5 cm).

(c) Patients' child B or C.

(d) The patient is not fit for operation, ASA greater than 3.

(e) History of any previous liver surgery.

(f) Residual liver small for size.

(g) Platelets count less than 100 000.

(h) Portal vein thrombosis.

Sample size

Conventional Sample of 25 patients for each group.

Selection method

Computerized Random Sample generator.

Ethical considerations

(a) Informed consent was taken from all patients.

(b) All data are confidential, and patients will not be mentioned by name in any published paper.

(c) Patients have the right to refuse to join the research or withdraw at any time without affecting their chance to receive the traditional therapy at any time.

(d) Approval of the ethical committee and written informed consent from all participants were obtained.

This study was approved by the Ethical committee of the Surgical department of Ain Shams University.

Study procedures

(a) Preoperative: by assessing the age, sex, laboratory profile, and imaging of the liver of these patients including computed tomography (CT) abdomen triphasic, CT volumetry, basal liver alpha-fetoprotein, metastatic workup either CT chest and bone scan or whole-body PET scan.

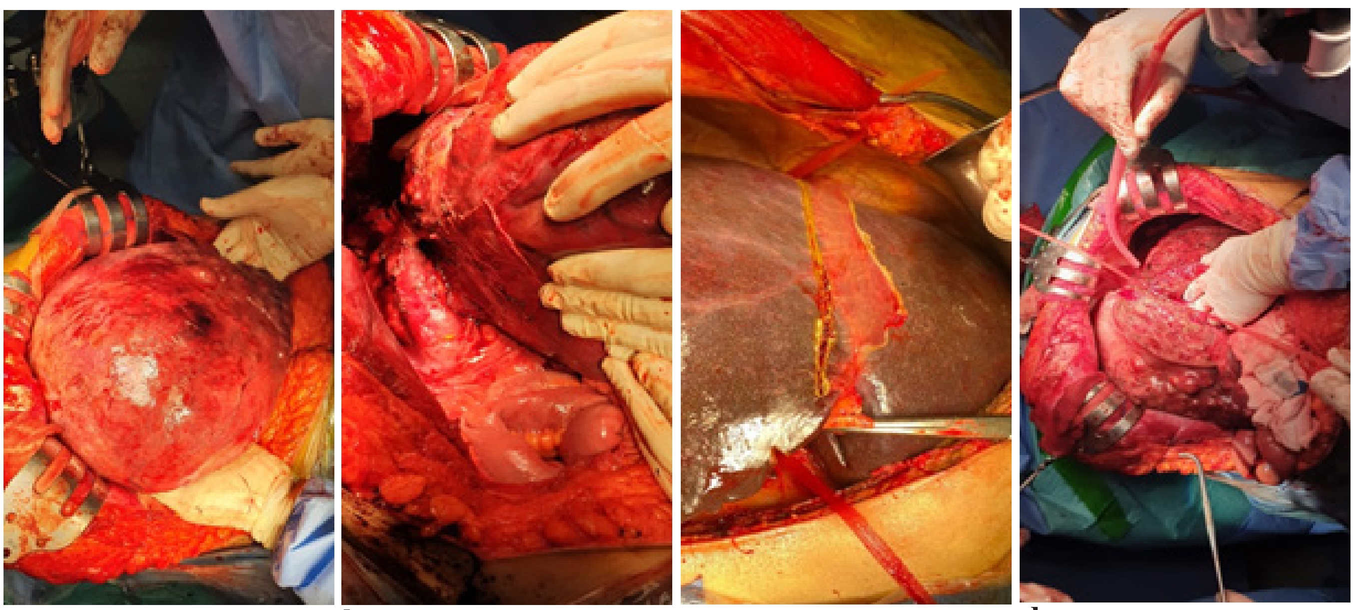
(b) Intraoperative monitoring of blood loss, surgical time, and organ injury.

(c) Postoperative: All patients received the same postoperative care by the same team of surgeons in the intensive care unit with monitoring postoperative bleeding, bile leak, and liver decompensation. Then clinical and biochemical data were monitored every week for 1 month and then every month for 1 year. Serum alpha-fetoprotein and CT scans were done to monitor for recurrences 1 month following surgery and then every three months after that. Every 3 months, chest radiography was carried out, and if a suspicious lesion was found, a CT scan of the chest was then conducted.

Surgical approach

During the study period, two methods for hepatic resection for large HCC were used. The right lobe of the liver is fully mobilized in the CA, and then extrahepatic vascular control is applied. The first step in the CA is hilar dissection, which divides and ligates the right hepatic artery and right portal vein, then the right lobe of the liver is rotated to separate it from the triangular and inferior vena cava (IVC) ligament, expose and divide the minute branches of the hepatic veins draining from segments 6 and 7, and the paracaval portion of the caudate lobe into the IVC, then right hepatic vein is then split, sutured, and wrapped. Hepatic parenchymatous dissection is then carried out (Fig. 1).

AA starts with control of vascular inflow and parenchymal transection before the right lobe is mobilized. Following the dissection of the right portal vein and hepatic artery, the arteries are split and sutured. Following the right inflow vascular division, the right, and left lobes can be easily distinguished from one another, but the precise transaction plane is determined by the tumor's position regarding the middle hepatic vein. Parenchymal liver dissection is carried out by CUSA and Harmonic (Fig. 2).



a **b** **c** **d**

Fig. 1: Conventional approach a) liver tumor, b) conventional approach (End of piggy pack and surrounding the right hepatic vein), c) conventional approach (Right lobe hanging), d) conventional approach hanging (After liver resection).

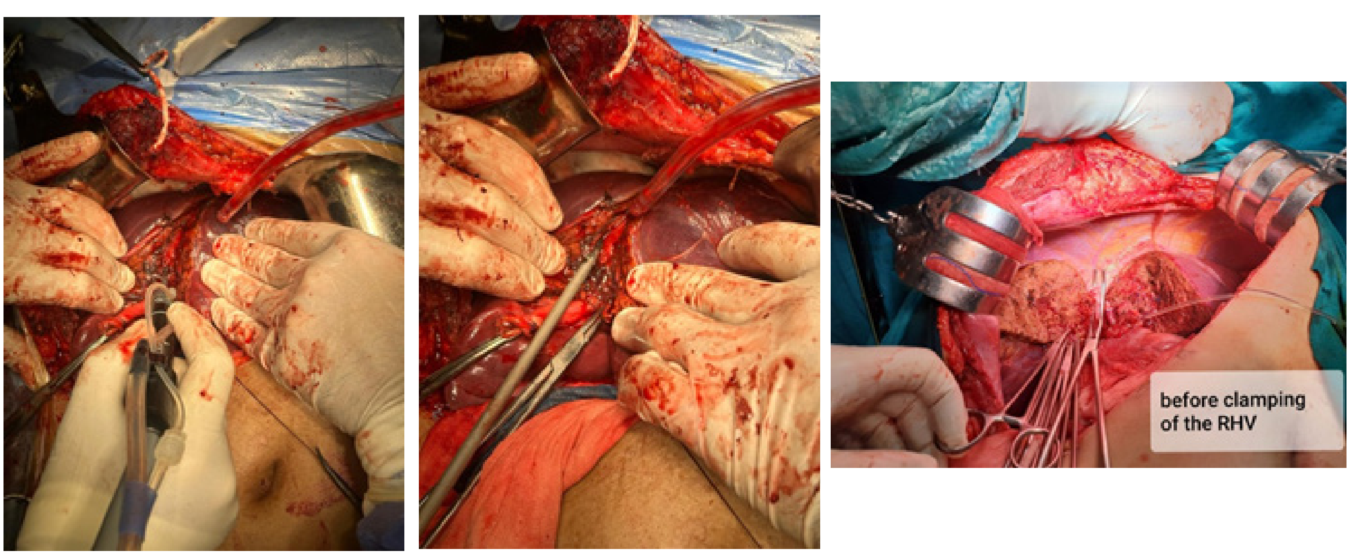


Fig. 2: Anterior approach a) dissection of liver parenchyma using CUSA, b) Anterior approach dissection of liver parenchyma using Harmonic, c) anterior approach (Liver parenchymal dissection).

RESULTS:

Total 50 patients were included in our study, 25 (50%) patients underwent AA right formal hepatectomy while 25 (50%) patients underwent CA right formal hepatectomy on large HCC on right live lobe,

Table 1 there is no statistically significant difference between CA group and AA group regarding demographic data and characteristics of the studied patients.

Also, the clinical data and preoperative laboratory investigation were comparable in both group regarding hepatitis C virus infection, hepatitis B virus infection, alcoholism, diabetes, hypertension, CHILD score in both groups (Tables 2 and 3).

Table 1: Demographic data were comparable in both groups of patients

	Conventional group *N*=25 [*n* (%)]	Anterior group *N*=25 [*n* (%)]	Test value	*P* value	Significance
Age (years)					
Mean±SD	53.2±4.72	53.2±4.57	0.000•	1.000	NS
Range	45–62	47–62			
Sex					
Female	3 (12.0)	4 (16.0)	0.166*	0.684	NS
Male	22 (88.0)	21 (84.0)			

P value greater than 0.05: Nonsignificant; *P value* less than 0.05: Significant; *P value* less than 0.01: Highly significant.
*Chi-square test.
•Independent t-test.

Table 2: Clinical data of the conventional group and anterior group regarding preoperative data of the studied patients

	Conventional group *N*=25 [*n* (%)]	Anterior group *N*=25 [*n* (%)]	Test value	*P* value	Significance
HCV AB					
Negative	3 (12.0)	3 (12.0)	0.000*	1.000	NS
Positive	22 (88.0)	22 (88.0)			
HBVsAg					
Negative	21 (84.0)	21 (84.0)	0.000*	1.000	NS
Positive	4 (16.0)	4 (16.0)			
Alcoholism					
Negative	24 (96.0)	24 (96.0)	0.000*	1.000	NS
Positive	1 (4.0)	1 (4.0)			
Diabetes					
Negative	14 (56.0)	12 (48.0)	0.321*	0.571	NS
Positive	11 (44.0)	13 (52.0)			
Hypertension					
Negative	13 (52.0)	13 (52.0)	0.000*	1.000	NS
Positive	12 (48.0)	12 (48.0)			
CHILD score					
A5	13 (52.0)	12 (48.0)	0.080*	0.777	NS
A6	12 (48.0)	13 (52.0)			

HBV AB, hepatitis B antibody; HBVsAg, hepatitis B surface antigen
P value greater than 0.05: nonsignificant; *P value* less than 0.05: significant; *P value* less than 0.01: highly significant.
*Chi-square test.
≠Mann–Whitney test.

Table 3: Comparison between conventional group and anterior group regarding preoperative laboratory investigations of the studied patients

	Conventional group *N*=25 [*n* (%)]	Anterior group *N*=25 [*n* %)]	Test value	*P* value	Significance
AFP ng/m					
Median (IQR)	600 (400–900)	700 (550–950)	−0.563≠	0.573	NS
Range	20–3800	26–4000			
Albumin					
Mean±SD	3.94±0.22	3.92±0.22	0.261•	0.795	NS
Range	3.5–4.3	3.4–4.2			
Total bilirubin					
Mean±SD	0.88±0.16	0.88±0.15	0.000•	1.000	NS
Range	0.5–1	0.6–1.1			
ALK					
Mean±SD	108.56±14.7	108.52±13.33	0.010•	0.992	NS
Range	90–140	90–138			
AST					
Mean±SD	70.88±13.49	69.4±11.99	0.410•	0.684	NS
Range	50–107	55–110			
UREA					
Mean±SD	4.93±0.69	4.88±0.74	0.256•	0.799	NS
Range	4–6.1	3.8–6.3			
CREA					
Mean±SD	0.88±0.16	0.84±0.16	0.985•	0.330	NS
Range	0.6–1.1	0.5–1.1			
HGB					
Mean±SD	12.12±0.46	12.23±0.48	−0.785•	0.436	NS
Range	11–13	11–13.1			
PLAT					
Mean±SD	226.2±35.98	216.2±30.32	1.063•	0.293	NS
Range	170–290	170–270			
PT					
Mean±SD	13.19±0.22	13.06±0.32	1.702•	0.095	NS
Range	12.9–13.5	12–13.5			
Tumor size					
Mean±SD	8.84±1.91	8.22±1.85	1.163•	0.250	NS
Range	6–13	6–12			
Cirrhotic liver					
Negative	6 (24.0)	8 (32.0)	0.397*	0.529	NS
Positive	19 (76.0)	17 (68.0)			
ASA					
I	3 (12.0)	3 (12.0)	0.170*	0.919	NS
II	19 (76.0)	18 (72.0)			
III	3 (12.0)	4 (16.0)			

P value greater than 0.05: Non-significant; *P value* less than 0.05: Significant; *P value* less than 0.01: highly significant.
*Chi-square test.
•Independent t-test.
≠Mann–Whitney test.

Operative outcomes

Regarding operative time there was no significant difference between both approaches. Average blood loss was highly significantly more in the CA [median 940 CC (800–2000) CC] than AA [median 600 CC (500–700) CC] (Fig. 3). As a result, more patients in the CA group required more blood transfusion and more pringles maneuver without statistically significant difference between both groups. Intraoperative iatrogenic tumor rupture during mobilization of the right liver occurred in 4 patients in CA, and 1 patient in the AA but was also not statistically significant (Table 4).

Table 4: Comparison between conventional group and anterior group regarding intraoperative data of the studied patients

	Conventional group No.=25	Anterior group No.=25	Test value	*P* value	Significance
Operative time (min)					
Mean±SD	381.8±61.3	410.92±70	−1.565•	0.124	NS
Range	240–500	280–510			
Blood loss (CC)					
Median (IQR)	940 (800–2000)	600 (500–700)	−3.460≠	0.001	HS
Range	100–2200	400–2100			
Blood transfusion					
No	18 (72.0)	23 (92.0)	4.410*	0.220	NS
1	1 (4.0)	1 (4.0)			
2	4 (16.0)	1 (4.0)			
3	2 (8.0)	0			
Pringle maneuver					
Without	21 (84.0)	24 (96.0)	2.000*	0.157	NS
With	4 (16.0)	1 (4.0)			
Intraoperative tumor rupture					
No	21 (84.0)	24 (96.0)	2.000*	0.157	NS
Yes	4 (16.0)	1 (4.0)			

P value greater than 0.05: nonsignificant; *P value* less than 0.05: significant; *P value* less than 0.01: highly significant.
*Chi-square test.
•Independent t-test.
≠Mann–Whitney test.

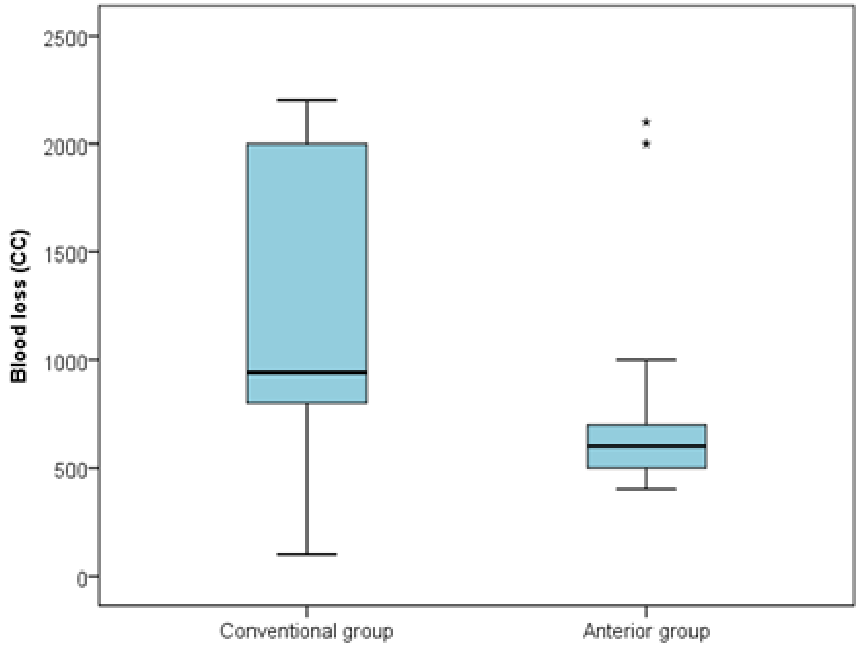


Fig. 3: Comparison between conventional group and anterior group regarding intraoperative amount of blood loss among the studied patients.

Postoperative outcomes

The average tumor free resection margin was 1.52 cm±0.47 in CA versus 1.43 cm±0.44 in AA and no pathological resection margin was involved and no lymphovascular permeation in both groups.

As regard postoperative drains, average amount of ascitic fluids in 24 h was significantly higher in CA group (402 cc) than AA group (226 cc).

However, there was no statistically significant difference between both groups as regard average bile and blood in drains.

In CA; four patients received two units packed red blood cells (RBCS) postoperatively and two patients received three units packed RBCS, this was significantly higher than AA group in which only three patients received one unit packed RBCS postoperatively.

As regard postoperative ICU stay the average stay in CA group (4 days) was significantly longer than AA group (2.8 days).

Also, the average hospital stays in conventional group (17 days) were significantly longer than AA group (9 days).

There were 6 patients in CA developed postoperative liver decompensation in CA and only 1 patient developed liver decompensation in AA which is statistically significant.

Hospital mortality occurred in one (4.0%) patient in the AA group and four (16%) patients in the CA group. The only mortality in the AA group was a male patient with a postoperative chest infection. The causes of death for the four patients in the CA group included liver failure and multiorgan failure secondary to liver failure (two patients), intraabdominal bleeding on the day 2 and re-exploration was done, and the patient died intraoperatively (one patient), chest infection (one patient) (Table 5).

Tumor recurrence

Following up, the CA group experienced 13 (52%) months and the AA group experienced 11 (44%) months tumor recurrences, respectively (Table 6, Fig. 4). In the AA group, effective treatment of the recurrences was more frequently possible. This is because patients in the AA group were more likely than those in the CA group to have isolated or localized recurring tumors.

Survival outcomes

The AA group's overall cumulative survival after 2 (83%) years was considerably better than that of the CA group (52.4%), and the group's median DFS was (13.46 months), which was statistically different from that of the CA group (18.6 months) (Fig. 5).

Table 5: Comparison between conventional group and anterior group regarding postoperative data of the studied patients

Postoperative No. = 25		Conventional group	Anterior group	Test value	*P-value*	Sig.
		No. = 25				
Tumer free resection margin	Mean ± SD	1.52 ± 0.47	1.43 ± 0.44	0.682•	0.499	NS
	Range	0.5 – 2	0.7 – 2			
Resection margin involved	Negative	25 (100.0%)	25 (100.0%)	–	–	–
Lymphovascular permeation	Negative	25 (100.0%)	25 (100.0%)	–	–	–
Ascitic	Mean ± SD	402.14 ± 137.52	226.32 ± 53.67	5.094•	0.000	HS
	Range	300 – 700	100 – 300			
Bile	Mean ± SD	250 ± 70.71	200 ± 0	0.577•	0.667	NS
	Range	200 – 300	200 – 200			
Blood	Mean ± SD	472.22 ± 112.11	370 ± 83.67	1.771•	0.102	NS
	Range	350 – 700	300 – 500			
Postoperative blood transfusion	No	19 (76.0%)	22 (88.0%)	9.220*	0.027	S
	1 unit	0 (0.0%)	3 (12.0%)			
	2 units	4 (16.0%)	0 (0.0%)			
	3 units	2 (8.0%)	0 (0.0%)			
Intensive care unit stay (days)	Mean ± SD	4.16 ± 0.99	2.88 ± 0.73	5.226•	0.000	HS
	Range	2 – 6	2 – 4			

Hospital stays	Mean ± SD	16.96 ± 2.88	9.20 ± 1.55	11.858•	0.000	HS
	Range	10 – 20	7 – 14			
Postoperative liver decompensation	No	19 (76.0%)	24 (96.0%)	4.153*	0.042	S
	Yes	6 (24.0%)	1 (4.0%)			
Postoperative bilirubin	Median (IQR)	2 (1 – 3)	2 (1 – 2)	-1.770≠	0.077	NS
	Range	1 – 9	1 – 8			

P-value > 0.05: Non significant; *P-value < 0.05*: Significant; *P-value < 0.01*: Highly significant
*: Chi-square test; •: Independent t-test; ≠: Mann-Whitney test

Table 6: Comparison between conventional group and anterior group regarding tumor recurrence and survival outcome data of the studied patients.

No. = 25		Conventional group	Anterior group	Test value	*P-value*	Sig.
		No. = 25				
INR	Median (IQR)	1 (1 – 1)	1 (1 – 1)	-0.469≠	0.639	NS
	Range	1 – 4	1 – 4			
Perioperative Mortality	Survivor	21 (84.0%)	24 (96.0%)	2.000*	0.157	NS
	Non survivor	4 (16.0%)	1 (4.0%)			
Recurrence during study period	No	8 (32.0%)	13 (52.0%)	3.157*	0.206	NS
	Yes	13 (52.0%)	11 (44.0%)			
	Died	4 (16.0%)	1 (4.0%)			
Time of recurrence (months)	Mean ± SD	13.46 ± 6.13	18.6 ± 2.41	-2.495•	0.021	S
	Range	6 – 22	16 – 24			
Survival within 2 years	Survivor	11 (52.4%)	20 (83.3%)	5.007*	0.025	S
	Non survivor	10 (47.6%)	4 (16.7%)			
Final outcome	Alive without disease	5 (23.8%)	10 (41.7%)	6.998*	0.072	NS
	Alive with disease	6 (28.6%)	10 (41.7%)			
	Died without disease	3 (14.3%)	3 (12.5%)			
	Died with disease	7 (33.3%)	1 (4.2%)			

P-value > 0.05: Non significant; *P-value < 0.05*: Significant; *P-value < 0.01*: Highly significant
*: Chi-square test; •: Independent t-test; ≠: Mann-Whitney test

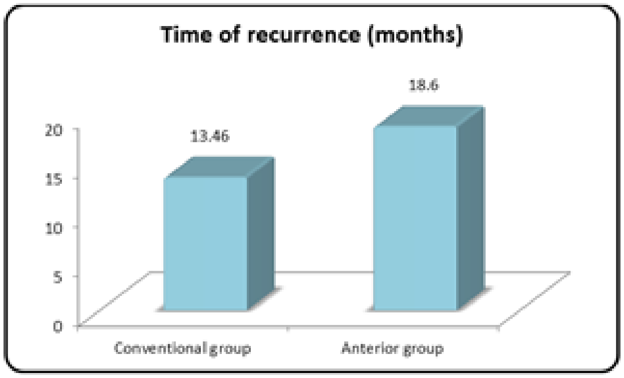


Fig. 4: Comparison between the conventional group and anterior group regarding time of recurrence among the studied patients.

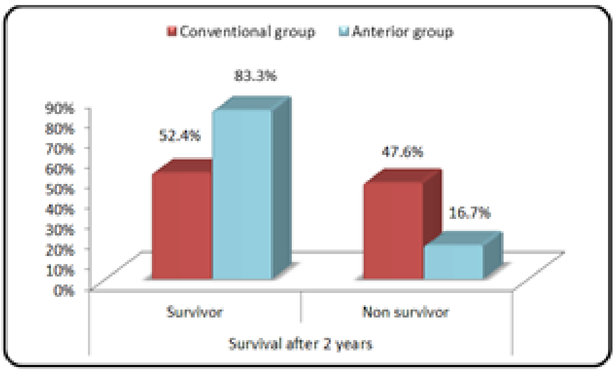


Fig. 5: Comparison between the conventional group and anterior group regarding percentage of survival after 2 years among the studied patients.

DISCUSSION

Because it provides the best results, liver resection is still the preferred course of treatment for HCC, especially for large tumors that nearly completely involve the right liver lobe.

In patients with large HCC, the AA yields better operation and survival outcomes as compared with the conventional technique, according to the current prospective randomized controlled research. As surgical methods have improved dissectors for parenchymal transection have become more cautious[13].

Regarding operative time in our study; there was no significant difference between the two approaches being 381 min in CA versus 410 min in AA. Similar findings were made by a study who discovered that there was no significant difference between the two approaches with average 415 min in CA versus 420 min in AA[10].

One of the biggest challenges in liver surgery is doing a RH on a patient who has a large HCC with underlying cirrhosis. In particular, patients with a large HCC may have limited space, making it difficult to mobilize the right liver.

Also, it is known that HCC is a highly vascularized, soft, and friable tumor. It is known that mobilizing the right liver in addition to the large tumor by the usual technique may have certain drawbacks. This included ischemia of the liver remnant due to rotation of the hepatoduodenal ligament, and severe bleeding due to avulsion of the hepatic vein and caval branches.

In our study we found that average blood loss of patients in AA group‘ 600 ml3’ was significantly lower than average blood loss of patients in the conventional group ‘ 940 ml3’, in Contrast to other study that showed average loss 500 ml3 in patients in AA group and 600 ml3 blood loss with patients in CA group which was not statistically significant[14].

Which means AA is able to prevent complications related to mobilization of the right liver, especially intraoperative blood loss.

Patients who needed intraoperative Pringles Manenver in our study were 16% in CA and 4% in AA which is statistically nonsignificant, this was similar to findings of previous study which showed 18% in CA versus 11% in AA which was also nonsignificant[10].

Another complication that may occur intraoperatively is iatrogenic tumor rupture, which could greatly increase the chance of postoperative HCC recurrence, in our study it occurred in four (16%) patients in CA and one (4%) patient of AA which led to spillage of cancer cells into the systemic circulation but this was statistically nonsignificant these results were similar to a previous study which showed (6.6%) of patients in CA and (1.6%) of patients in AA which also nonsignificant[9].

Average postoperative intensive care unit stay there was a significant difference between both groups being 4.1 days for the CA group and 2.8 days for the AA group, a previous study showed no significant difference between the two groups 2 days for the CA group and 1.5 days for AA group.

Average hospital stay was a statistically significant difference between both groups being 17 days in CA and 9 days in AA, in contrast to our study, the previous study showed no significant difference between two groups 12.5 days for the CA group and 11 days for the AA group[10].

This may be explained by a higher percentage of cirrhotic patients in our study (72%) versus (31%) in the other study[10].

In our study 6 patients (24%) developed liver decompensation in the CA group, while only one (4%) patient developed liver decompensation in the AA group which is significant.

Regarding hospital mortality there was no statistically significant difference between the two groups average of 16% in CA and 4% in AA, this was similar to a previous study which showed 8.9% in CA vs 9.1% in AA[14] and another study showed 13% in CA versus 6% in AA[15].

Mortalities in the CA group were four patients (two patients) related to liver cell failure and multiorgan failure secondary to liver cell failure, one patient related to postoperative bleeding on the day 2 and re exploration was done and the patient died intraoperatively and one patients related to chest infection, the only one mortality in AA was related to a chest infection. The observation aligned with Ozawa’s initial hypothesis that an AA could improve postoperative liver function preservation by preventing prolonged hepatic lobe rotation and displacement, which would impair the liver remnant’s afferent and efferent circulation[16].

It has been documented that excessive intraoperative bleeding increases perioperative mortality and negatively impacts postoperative liver function[17]. Additionally, it has been proposed that perioperative transfusion is linked to an early HCC recurrence following hepatic resection, which results in a brief overall and DFS[18–20]. Afterwards, a number of studies have confirmed that, for patients with a large hepatic HCC, the AA technique is the best approach[21].

Previous studies also showed that patients undergoing AA exhibited better oncological outcomes compared with those undergoing CA[9,15,22]. According to this study, patients who had AA had a much better prognosis in terms of early HCC recurrence (2 years) after surgery.

It has been documented that hematogenous dispersion of malignant tumor cells occurs with surgical resection of prostatic, colorectal, and biliary-pancreatic cancers[23–26]. The ‘no-touch isolation technique’ has been shown to prevent intraoperative shedding of tumor cells into the portal vein during colorectal cancer resection. It was thought to be related to the manipulation of the tumors during surgery[27]. Venous penetration or vascular invasion of the tumor is a common occurrence in patients with HCC. The high rate of hematogenous dissemination prior to resection may be caused by this process, yet compression of the tumor during mobilization may accelerate the spread of tumor cells into the intrahepatic portal venous system or the systemic circulation[28,29].

Regarding time of recurrence, there was a statistically significant difference between the two groups average 13.4 months in CA and 18.6 months in AA, in contrast to the previous study which showed no statistically significant difference between the two groups' average 13.9 months in CA and 15.5 months in AA[10], this may be due to the higher percentage of tumor rupture in our study in comparison to other studies.

In our study, the percentage of survival after 2 years was 52.4% in CA and 83.3% in AA which is statistically significant, a previous study assessed the survival through mean survival in months which was an average of 22 months in CA and more than 68 months in AA which was statistically significant[10].

This may be due to the recurrence of the tumor in AA being localized in contrast in the recurrence of the tumor in CA which was systemic.

Although the anterior method has advantages over the CA, it may also have a risk. At the deeper plane of parenchymal transection from the middle or right hepatic vein, there may be bleeding. Hemorrhage can be significant and challenging to control if the right liver and tumor are not mobilized beforehand, and the right hepatic vein is not under control. When it happens, the traditional method should not be employed to locate and control the bleeding location; instead, the Pringle maneuver or total vascular occlusion should be utilized. Even without inflow vascular control, precise parenchymal transection can be achieved with an ultrasonic dissector and minimal blood loss with sufficient experience in liver resection and surgical technique improvement.

According to our recent experience, massive bleeding rarely happens during liver transection during AA hepatectomy.

Belghiti and colleagues recommended altering the AA strategy to reduce the danger of major venous hemorrhage and to make hepatic parenchymal transection easier[30]. The ‘hanging maneuver’ was the method they advocated. It involved blindly passing a lengthy vascular clamp down the front surface of the IVC’s midline, on the left side of the inferior right hepatic vein, and cranially up to the area where the right and middle hepatic veins meet.

A tape is used to raise the liver during parenchymal transection. The risk of significant venous hemorrhage is reduced with this alteration of the anterior access technique by the hanging maneuver.

CONCLUSION

Although AA approach is technically more complex, AA has proven to have many benefits over CA as it improved operative and survival outcomes Consequently, in patients with large HCC, RH via the AA may be advised as the recommended method or even as a standard procedure for liver resection..

CONFLICT OF INTEREST

There are no conflicts of interest.

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