

Evaluation of ALPPS and PVE in management of HCC

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Abstract

I. Back ground:

Portal vein embolization (PVE) has been developed with the principle of inducing hypertrophy of the FLR (10–50 % after a period of 2–8 weeks). Tumor progression and insufficient hypertrophy of the FLR are the commonest causes that preclude definitive surgery in 10-30% of patients.

Recently, ALPPS has been proposed, with the goal of achieving a faster and magnified hypertrophy (74–87.2 % in 9–13 days) for patients with extensive colorectal liver metastases or hilar cholangiocarcinoma, however, introducing ALPPS for HCC on top of cirrhosis has been questioned, and not thoroughly investigated .

II- Methods:

A prospective observational study was conducted on patients who were admitted to the National Liver Institute from 2016 to 2018 with non-resectable liver tumors due to insufficient FLR. Hypertrophy of the future liver remnant, perioperative morbidity and mortality, overall survival, and other parameters were compared between patients who underwent ALPPS and patients who underwent PVE.

III- Results:

Nineteen patients, of which 17 patients had HCC, underwent 1st stage ALPPS. While, 26 patients, of which 20 patients had HCC, underwent PVE.

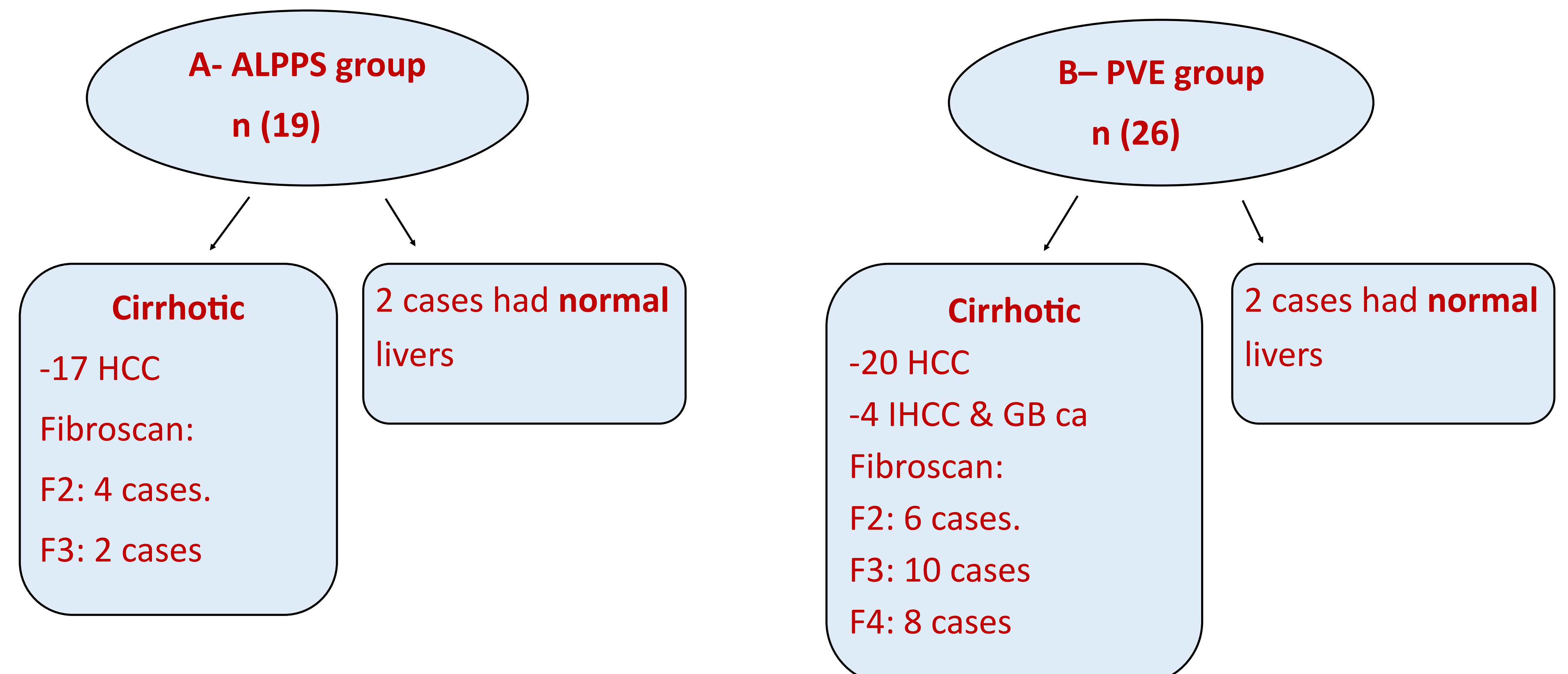
The mean of the percentage of hypertrophy at 2 weeks for ALPPS group was 41.62±39.7. The mean of hypertrophy post PVE at 2 weeks was 37±5.77 %.

Fourteen (73.6%) patients could be operated upon for definitive resection in the 2nd stage of ALPPS. Fourteen (54%) patients underwent resection after PVE.

IV- Conclusion:

Despite the morbidity of ALPPS in cirrhotic patients, it still can be introduced with strict criteria. Although ALPPS produces more extensive hypertrophy than PVE and less likely progression of the tumor to the FLR, PVE has less overall morbidity and mortality.

Study population



Drop-out cases post 1st stage ALPPS (n 5) (26%):

- Ascites (2)
- Tumour progression to FLR (1)
- patient had malignant LN (1)
- patient withdrew. (1)

Drop-out cases post PVE (n 12) (46%):

- PVE not done due to collaterals (2)
- Leakage and embolization of LT PV (2)
- Tumour progression to FLR (4)
- Insufficient hypertrophy (2)
- Patient withdrew (2)

Table (1): Univariable analysis of potential risk factors for ALPPS

Variables	P-value
Fibrosis score	<0.001 ^{HS}
Age (years)	0.047 ^S
MELD score	0.025 ^S
AFP	0.032 ^S
Gender	
Male (n=16)	0.126 ^{NS}
Female(n=3)	0.126 ^{NS}
1st stage Techniques (n)	
Classic (n=7)	0.578 ^{NS}
Open RFALPPS (n=10)	0.848 ^{NS}
Lap. RFALPPS (n=2)	0.448 ^{NS}

Table (2): Patients who get the FLR target volume after PVE in relation to the degree of liver fibrosis

Degree of fibrosis	Sufficient volume at 2 weeks		Sufficient volume at 6 weeks	
	No	%	No	%
F1 (no=2)	2	100	2	100
F2 (no=6)	6	100	6	100
F3 (no=8)	6	75	8	100
F4 (no=6)	4	66.67	4	66.67

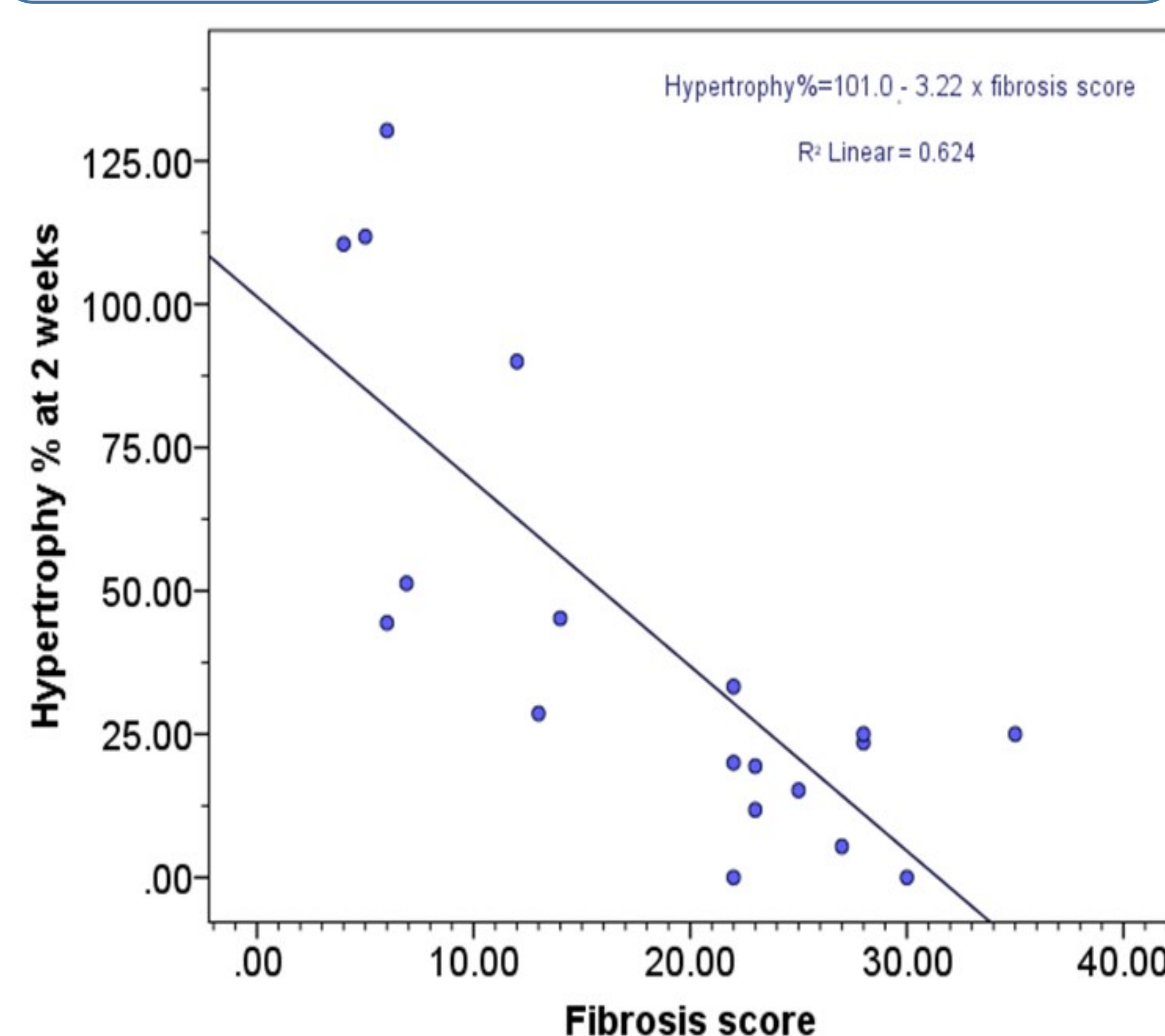
Table (3): The changes in the hypertrophy degree (HD) of the (FLR) at 2 weeks and 6 weeks after PVE according to the degree of liver fibrosis F

* (HD of FLR = FLR % after PVE - FLR % before PVE)

	F2(6)	F3(8)	F4(4)	P value
HD FLR 2wks	24.2±10.6	13.6±1.2	11.3±6.03	0.006
HD FLR 6wks	37.7±1.4	25.3±7.9	21.7±1.3	0.001

MULTIVARIABLE ANALYSIS: Multiple linear regression analysis suggested that the prediction of hypertrophy percentage at 2 weeks should be limited to **FIBROSIS SCORE**

Figure (1): Multivariable dependent factors of linear regression analysis



Take home message:

- **Cirrhosis** and **HCC** must not be considered as contraindications for the two staged hepatectomy ALPPS as it can be **safely** done even for grade F4 fibrosis; however, **caution** should be taken, besides weighing the potential benefits and risks of this procedure.
- The degree of **fibrosis** is the **most important factor** that affects the **hypertrophy** of the FRL; however, other factors such as age, MELD score should be considered when reviewing a patient with a large liver tumor that needs an extended resection.
- Although **portal vein embolization** provides less extensive hypertrophy than ALPPS and a greater chance for progression of the tumor to the FRL, it acts as the most reliable test of the liver functions; thus, **PVE could not be totally substituted by ALPPS**, and it still has its indications.
- Both normal and diseased livers can grow in response to PVE. **Cirrhotic livers** regenerate at a **slower** rate and to a **lesser** extent than normal livers.

Table (4): Mean features of 1st stage ALPPS and PVE.

	1 st stage ALPPS	PVE
No. of patients	19	26
No. of cirrhotic patients (F3 & F4)	13 (68.4%)	18 (69%)
Hypertrophy 2 wks	41.62±39.7%	37±5.77%
Hypertrophy 6 wks	54.75±21.4%	55±5.0%
Hepatic decompensation	5 (26%)	0
Major complications	0	4 (15%)
Tumor progression to contralateral lobe	1 (5%)	4 (15%)
Mortality	0	0
Definitive surgery (resection)	14 (73.6%)	14 (54%)