Results

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Patients characteristics:

This present study included 90 patients; 41 patients (46 %) included in group I (auto-transfusion group) and 49 patients (54 %) included in group II (homo-transfusion group) *(Fig 1).*

In the first group, the age of the patients ranged between 18-67 years old with a mean age of 43.78 years while in the 2nd group, the age of the patients ranged between 18-68 years with a mean age of 44.87 years.

The mean body weight of the patients in group I was 77.6 kg (ranged between 64-93 Kg) while in group II was 75.95 Kg (ranged between 59-87Kg).

FIGURE 1 :PIE CHART SHOWING PERCENT DISTRIBUTION OF THE STUDIED GROUPS

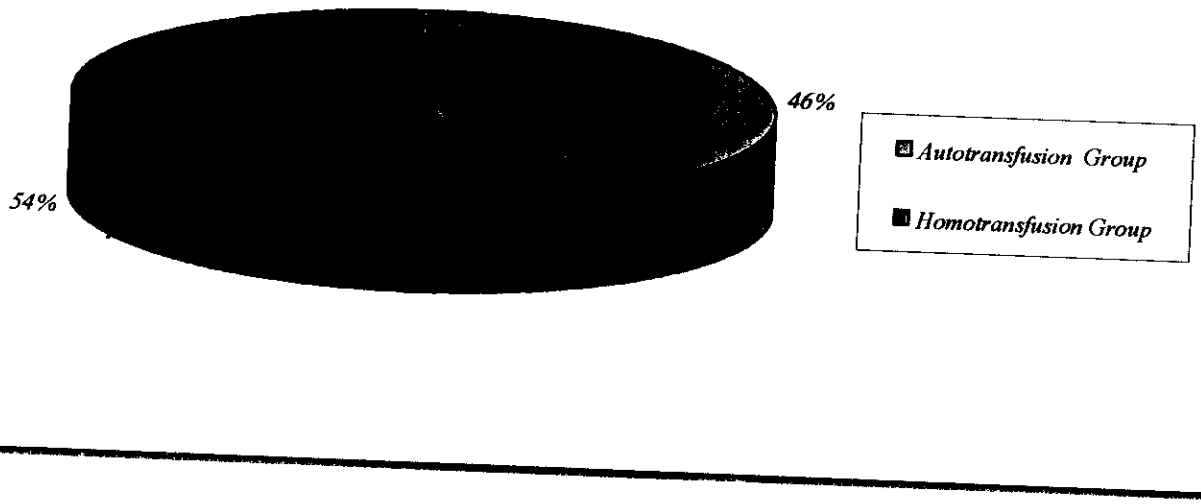


Table 1 patient characteristics:

	Auto-transfusion group	Homo-transfusion group	P value
Age (years):			
mean	**43.8**	**44.9**	**>0.05**
Body weight (kg) :			
mean	**77.6**	**76.0**	**>0.05**
Sex:			
male no. (%)	**22(53.7)**	**29(59.2)**	**>0.05**
female no. (%)	**19 (46.3)**	**20 (40.8)**	**>0.05**

The first group included 22 males (53.69%) and 19 females (46.31%) while the second group included 29 males (59.18%) and 20 females (40.82%).

There was no statistical significant difference in patients characteristics in both groups *(table 1).*

Autologous blood donation:

The 41 patients of group I donated 62 units of autologous blood; 21 patients (51.2 %) deposited 2 units while 20 patients (48.8%) deposited only one unit of blood (i.e the mean donation for every patient was 1.51 units. The 20 patients who deposited only one unit of blood were either due to short time before operation or due to decrease of Hb% at the time of the 2nd donation below 11.0 gm/dl.

Of 62 units deposited by patients in first group, 37 units (59.7%) were deposited by 22 males while 25 units (40.3%) deposited by 19

females (i.e the mean donation for every male was 1.68units and for every female was 1.31units). 13 females donated one unit of blood while 7 males donated one unit of blood. Of 21 patients donated 2 units ; Only 6 females (28.6%) donated 2 units of blood and 15 males (71.4%) donated 2 units and so males donated more than females.

The 41 patients donated 62 units of blood without side effects except one female patient developed dizziness after donation treated by sweeted juice and elevation of legs in recumbence position. This was either due to transient hypovolemia or vasovagal stimulation which was compensated rapidly by the body.

All deposited blood was transfused to the patients during or within 72 hours post-operatively.

In group II, homologous blood needed for the patients were collected from 117 volunteer donors; 22 units were discarded due to presence of hepatitis viruses (B,C) and 95 units were transfused to the patients.

Hb and RBCs production after operation :

The mean Hb level in the pre-operative visit in group I (after donation), was 10.95± 0.56 gm/dl while in group II, was 11.29±0.63 gm/dl. On the end of study, 2-weeks postoperatively, the mean Hb level in group I was 11.0±0.59 while in group II was 10.25±0.53 gm/dl.

Table 2 Mean Hb level at different visits:

	Auto-transfusion group	Homo-transfusion group	P value
One-day preoperative visit	10.95 ± 0.56	11.29 ± 0.63	>0.05
One-day postoperative visit	10.24 ± 0.53	10.10± 0.50	>0.05
7-days postoperative visit	10.35 ± 0.55	9.95 ± 0.53	<0.05
2-weeks postoperative visit	11.0 ± 0.59	10.25 ± 0.53	<0.05

There was no significant difference in Hb level between both groups one-day pre-operatively and one day post-operatively but there was significant difference between the two groups one-week postoperatively and was highly significant difference 2-weeks postoperatively, meaning increased Hb production in group I was more than in group II *(table 2)&(Fig.2).*

The mean Hb production after operation till 2-weeks post operative was calculated as follow:

Mean Hb production=
Mean Hb level 2-weeks postoperative–Mean Hb level 1-day postoperative.

It was 0.76gm/dl in group I and 0.15gm/dl in group II.

Similarly, there was no significant difference in hematocrit value (Hct) between the 2groups in the preoperative and 1-day post-operative visits while there was significant difference in the 1-week and 2-weeks post-operative visits *(table 3).* As, the Hct was increased in group I more than in group II at the end of study.

FIGURE 2 : COLUMN CHART SHOWING MEAN HB AT DIFFERENT VISITS AMONG THE STUDIED GROUPS

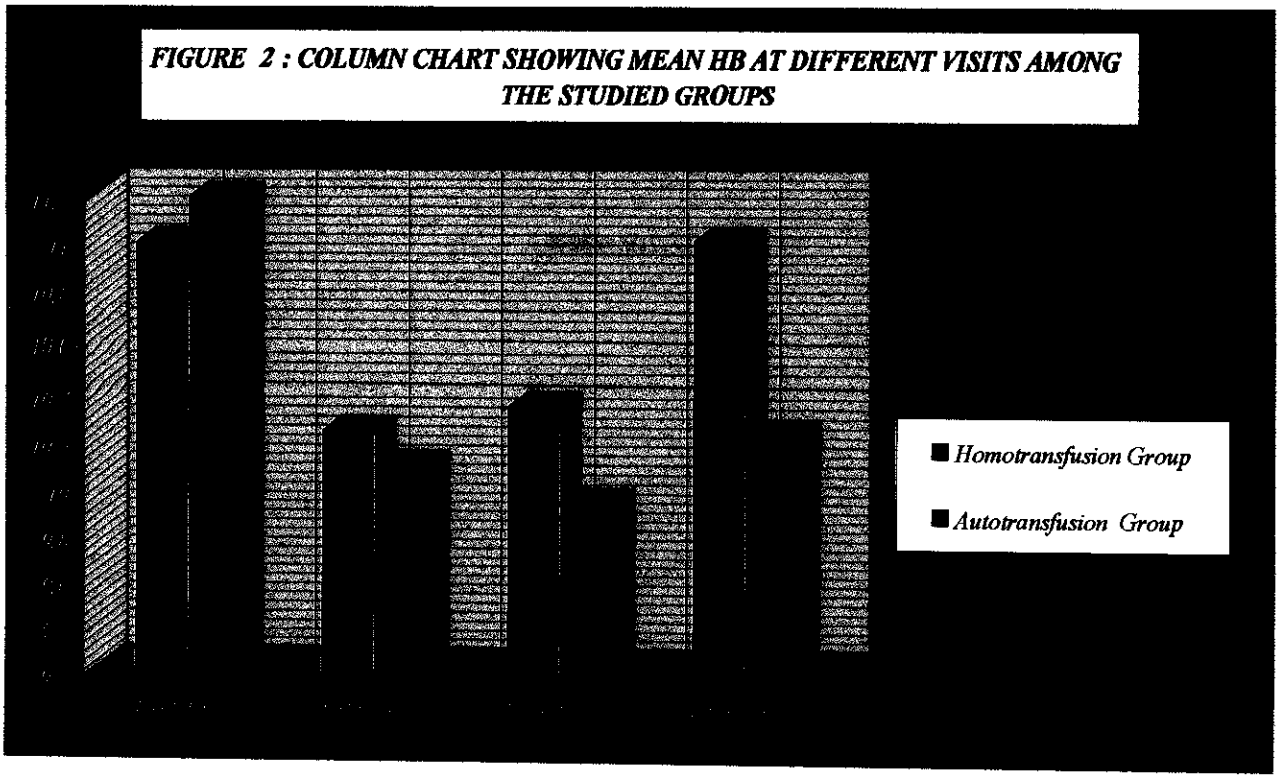
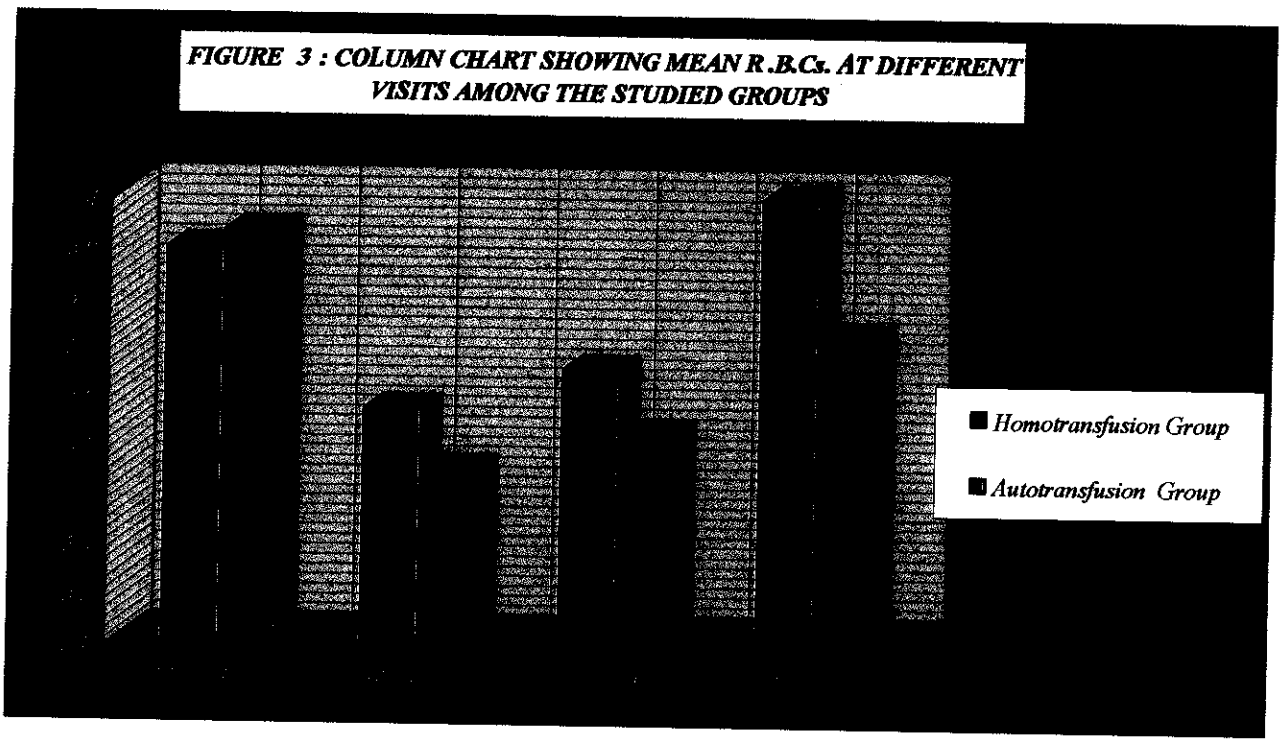


FIGURE 3 : COLUMN CHART SHOWING MEAN R.B.Cs. AT DIFFERENT VISITS AMONG THE STUDIED GROUPS



Mean RBCs count had no significant difference in the pre-operative visit in both groups but there was significant difference in the one-day and one-week post operative visits while was highly significant in 2-weeks post-operatively. So, the production of RBCs was more in group I than in group II *(table 4) & (Fig 3)* .The mean post-operative RBCs production in group I was $0.427x10^6/mm^3$ while in group II was $0.269x10^6/mm^3$.

There was no significant difference in WBC and platelets among different visits between the 2 groups.

Table 3 Mean hemactocrit value at different visits :

	Auto-transfusion group	Homo-transfusion group	P
One-day preoperative visit	33.2±1.8	33.8±2.8	>0.05
One-day Postoperative visit	31.0±1.6	30.8±1.5	>0.05
One week postoperative visit	31.3±1.7	30.2±1.7	<0.05
2-weeks postoperative visit	33.4±1.8	31.2±1.7	<0.05

Table 4 : Mean RBCs count ($x10^6$) at different visits

	Auto-transfusion Group	Homo-transfusion group	P value
One-day preoperative visit	3.888±0.298	3.923±0.242	>0.05
One-day postoperative visit	3.566±0.197	3.446±0.193	<0.05
1- week postoperative visit	3.649±0.229	3.517±0.232	<0.05
2-weeks postoperative visit	3.993±0.263	3.715±0.214	<0.01

Change of blood picture during donation:

The mean Hb decrease between donations or between last donation and operation was 1.12gm/dl /donation of 400 ml of autologous blood. The mean decrease after the first donation was 1.16gm/dl/donation while the mean decrease of Hb after the second donation was 0.94/dl /donation. That is means the ability of the body to compensate for blood loss after the second donation more than after the first donation by the aid of administration of 200 mg of elemental iron per day. The mean decrease in Hb per donation was more in male (1.14gm/dl) than in female (1.06gm/dl) that means ability of females to compensate for blood loss than males.

The mean decrease in Hb per donation among patients with neoplastic tumours was 1.18 gm/dl while in the benign conditions was 1.05gm/dl. This means that the patients with neoplastic tumours have less ability to compensate for Hb loss like other patients. This is possibly because the neoplastic tissues usually overcome normal tissues in benefiting of blood and metabolism.

The mean decrease in Hb among patients who donated 4-days preoperative (1.23gm/dl) was more than among patients who donated 7-days pre-operative (1.11gm/dl).

The pre-donation Hb level among patients who donted 2 bags of blood was (12.3-13.6 gm/dl) with a mean 12.9gm/dl.

All patients entered the operation with Hb level not less than 9.9gm/dl with a mean level 10.7gm/dl.

The mean decrease of hematocrit value per donation was 3.5%. The mean pre-donation hematocrit value for patients who donated 2 units of blood was 39.9% .The mean hematocrit value pre-operative was 33.2%

The mean decrease in RBCs count per donation was $486x10^3$. It was more after the first donation than after the second donation an it was 541 $x10^3$ after the 1st donation and was 423 $x10^3$ after the 2nd donation. That means response of the body to synthesize RBC after the 2nd donation more than after the 1st donation .

There was no significant difference in leukocytic count and platelet count among different donation. That means rapid compensation of the body for leukocytes and platelet loss.

Cases included in the study:

Variety of cases included in this study (table 5). In group I, the most included cases were the major plastic surgical cases (12) 29.26% , B.P.H cases (8) 19.5%, cancer breast cases (6) 14.63%, and fibroid uterus cases (4) 9.75% .

The most included malignant tumour cases were cancer breast(6) 14.63%, hypernephroma (2)4.87% and colo-rectal tumours (2) 4.87%.

Of 13 cases of colo-rectal tumours included in this study only 2 cases were fit for donation, the first case was a female patient with cancer rectum, donated one unit and took additional unit of homologous blood. The other case was a male patient with cancer sigmoid donated 2 units of blood and took his own blood only without additional homologous blood. The 11 patients of colon tumour who did not deposit blood, two of them

refused donation although their hemoglobin was more than 11.0gm/dl and the other 9 patients (69.2%) had hemoglobin level less than 11.0gm/dl.

Also, of 5 cases of cancer bladder, 3 of them (60%) were unable to predeposit blood because their Hb was less than 11.0gm/dl, one patient refused to predeposit and only one patient predeposited 2 bags of blood.

Of 6 patients of renal tumours (hypernephroma),2 of them deposited 2bags each, 3 patients (50%) were unfit for predeposition of autologous bleed as their Hb was less than 11.0gm/dl and one patient refused donation.

Table 5: Cases included in both groups:

	Auto-transfusion Group		**Homo-transfusion group**		**Total**	
	No	**%**	**No**	**%**	**No**	**%**
Cancer breast	6	14.6	3	6.12	9	10
Abdominoplasty	12	29.3	10	20.4	22	24.4
Fibroid uterus	4	9.8	3	6.1	7	7.8
B.P.H	8	19.5	6	12.3	14	15.5
Hypernephroma	2	4.9	4	8.2	6	6.7
Cancer bladder	1	2.4	4	8.2	5	5.6
Stone kidney	2	4.9	1	2.04	3	3.3
Colo-rectal tumours	2	4.9	11	22.4	13	14.4
Splenic cyst	1	2.4	2	4.1	3	3.3
Cancer thyroid	1	2.4	2	4.1	3	3.3
Hepatoma	0	0	1	2.04	1	1.1
Other abdominal surgical cases	2	4.9	2	4.1	4	4.4
Total	41	100	49	100	90	100

The other different cases of group II (30cases);4 patients were unable to predeposit autologous blood as their Hb was less than 11.0gm/dl and the other patients refused to donate.

Follow up of transfusion:

161 units of blood were transfused to patients in both groups, 66 units transfused to patients in group I with a mean value 1.56 units to every patient and 95 units in group II with a mean value 1.93 units to every patient.In group I, only 4 units of homologous blood were transfused besides the other 62 units of autologous blood. All units of blood collected were transfused to their own patients. The total number of homologous blood transfused was 99 units; 4 units for patients in group I and the other 95 units for patients in group II.

Among 41 patients of group I, only 4 patients (9.75%) needed additional homologous blood. They needed 4 units; one unit for each patient. One of these 4 patients deposited 2 units and operated for radical cystectomy in early diagnosed cancer bladder and the other 3 cases deposited one unit.

In group I, 17 patients received one unit, 23 patients took 2 units (20 patients took their autologous blood + 3 patients took additional one unit of homologous blood for each), and only one case of cancer bladder took 3 units *(table 6)*. The latter case donated 2 units and took besides them additional one unit of homologous blood.

In group II, 9 patients needed one unit, 34 patients needed 2 units and 6 patients needed 3 units of blood *(table 6)*.

Table 6: Distribution of studied groups according to No. of blood units transfused :

	One unit		Two units		Three units	
	No	%	No	%	No	%
Auto-transfusion group	17	42.34	23	55.22	1	2.44
Homo-transfusion group	9	18.37	34	69.39	6	12.24
Total	26	29.11	57	63.11	7	7.78

$X^2 = 6.544$ $P < 0.05$

Occurrence of transfusion reactions;

In this study, one transfusion complication (1.56%) occurred in group I which was post transfusion thrombophlebitis *(table 7)*. This case of thrombophlebitis was developed after transfusion of 2 bags of autologous blood, the patient felt pain and tenderness at the site of canulation after transfusion.

In group II, there were 6 cases of transfusion reactions (6.31%) *(table 7)* there were 3 cases of thrombophlebitis, one case of urticarial rashes, one case of febrile reaction and one case of delayed hemolytic reaction.

Table 7: Distribution of studied group according to type of transfusion reactions occurred:

Type of reaction	Auto-transfusion group (41)		Homo-transfusion group (49)		Total(90)	
	No	%	No	%	No	%
Febrile reaction	0	0	1	2.04	1	1.1
Urticarial rashes	0	0	1	2.04	1	1.1
Delayed hemolytic reaction	0	0	1	2.04	1	1.1
Thrombophlebitis	1	2.4	3	6.12	4	4.4
Total	1	2.4	6	12.24	7	7.7

In case of urticarial rashes, the case transfused during operation and developed petecheal rashes in face, arms, legs and chest. There was no tachycardia, hypotension, sweating, respiratory distress or oozing from surgical wound. So, it was diagnosed as urticarial rashes. The patient took antihistaminic medication (Avil i.v) and i.v. corticosteriod, the rashes disappeared after 15 minutes and transfusion was continued again very slowly with great observation without additional problems.

In case of febrile reaction, the patient was female, married, multi-parous, aged 49 years and operated for partial liver resection. She infused 2 bags of blood during operation and a third bag after 12 hours of operation. During the transfusion of the 3rd bag after operation she developed headache, mild chill and pyrexia (temperature was 38.3). There was no hypotension, dyspnea or chest pain and urine output was within normal. The transfusion was discontinued and the patient was managed by cold fomentation and i.v antipyretic (Aspegic).The bag was sent to blood

bank for blood group testing and cross matching and there was no error in testing. A blood sample taken from the patient and centrifuged, cleared absence of hemoglobinemia. With observation of Urine, there was no hemoglobinuria. So, the case was diagnosed as febrile reaction.

The last reaction, mild delayed hemolytic reaction was developed in male patient operated for radical cystectomy and transfused 2 bags of homologous blood during operation. The patient was had fluctuating increase of body temperature (37.8°-38.7 °C) without obvious cause of pyrexia as chest infection or wound infection or apparent phlebitis. The Hb level was 10.3gm/dl one-day post-operatively and total serum bilirubin was 0.9 I.U. pre-operatively. One-week post-operatively, patient Hb decreased to 8.5gm/dl and bilirubin level increased to 1.8 I.U. The urine output was normal and renal function tests were within normal with no significant difference from pre-operative levels. A blood sample was taken from the patient and centrifuged which detected a mild degree of hemoglobinemia. So it was suspected as mild degree of delayed hemolytic reaction .

Post operative follow up:

1)Post-operative temperature:

There was no significant difference between the 2 groups in relation to the mean postoperative temperature and minimal temperature recorded, but there was a significant difference in relation to maximal postoperative body temperature recorded *(Table 8)&(Fig4)*.That means increased incidence of postoperative infection (chest infection, wound infection) and possibility of body reaction to homologous blood transfused.

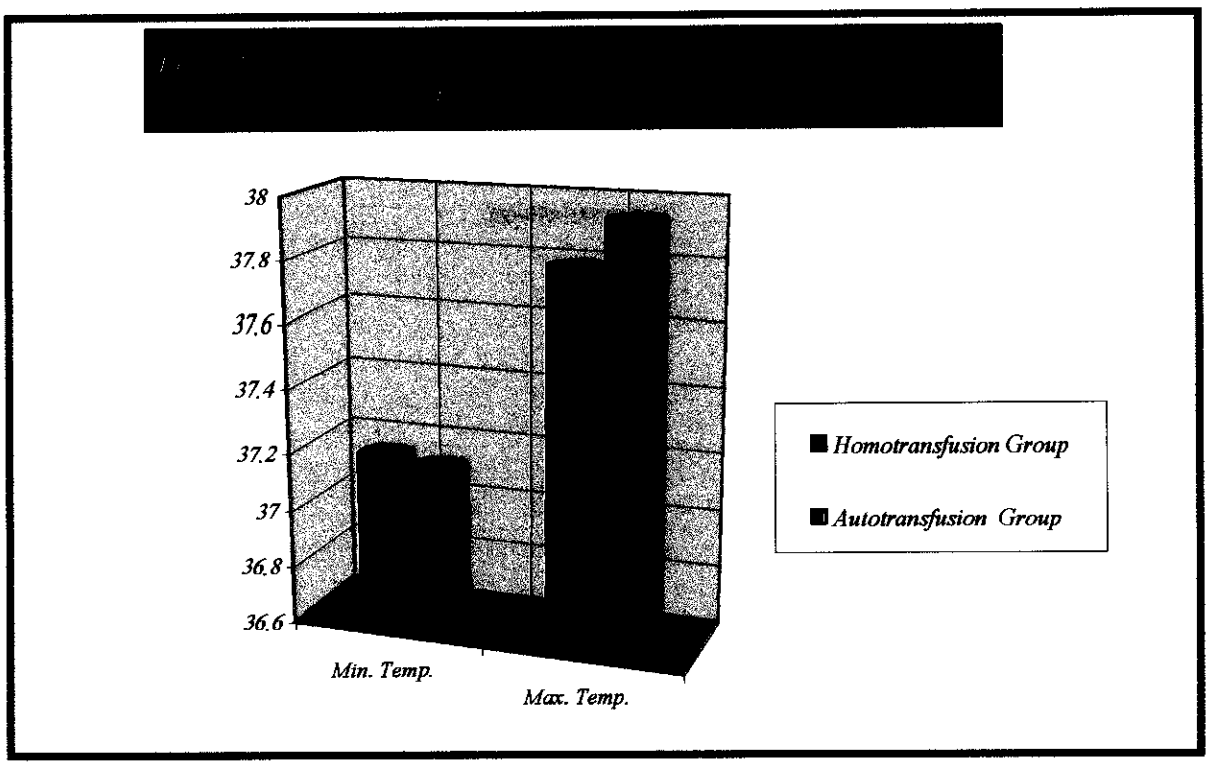
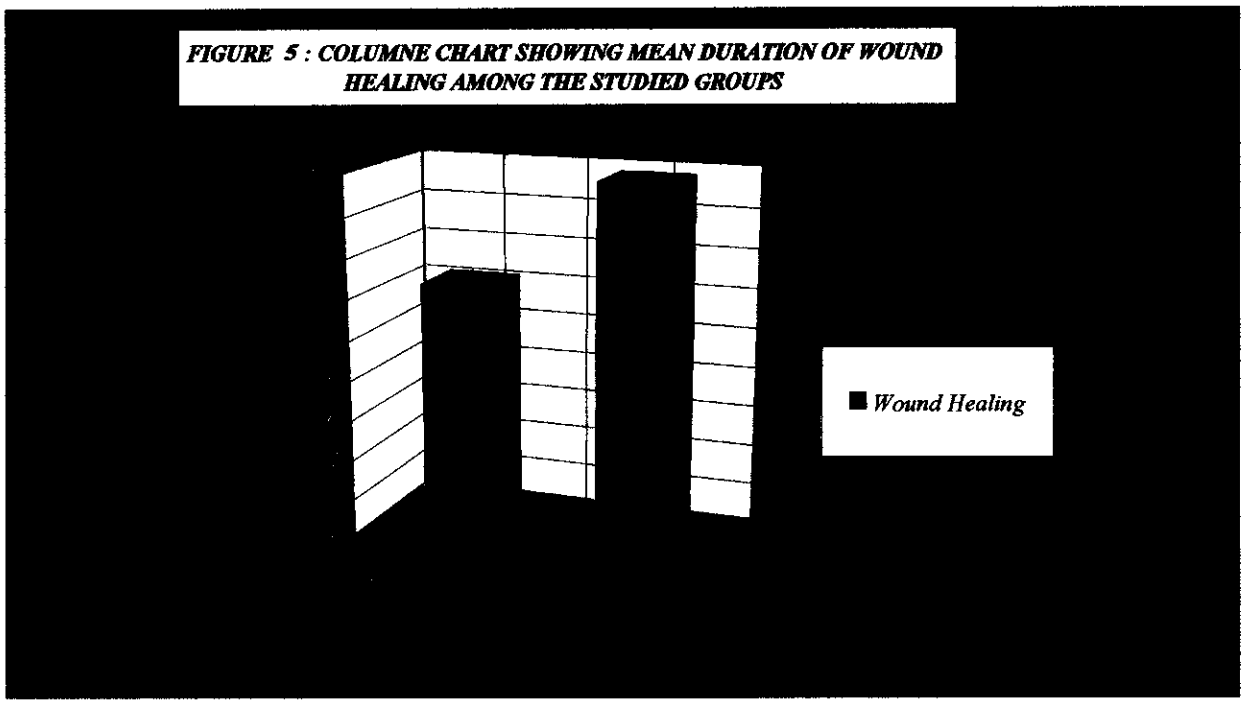


FIGURE 5 : COLUMNE CHART SHOWING MEAN DURATION OF WOUND HEALING AMONG THE STUDIED GROUPS



The patients who developed post-operative pyrexia (above 38°C) were 10 patients (24.3%) in group I, and 21 patients (42.9%) in group II. The cause of pyrexia in group I, was due to chest infection in 5 patients, wound infection in 4 patients and apparent phlebitis at the site of canula in one patient. In the second group, the cause was due to chest infection in 6 patients, wound infection in 10 patients, combined chest and wound infection in one case, apparent phlebitis at the site of canula in two patients, suspected hemolytic reaction in one case and finally one case with unexplained pyrexia. There was a correlation coefficient (r) between number of homologous blood units transfused and occurrence of post-operative pyrexia,($P<0.05$).

Table 8: Mean post-operative temperature among studied groups :

	Auto-transfusion group	Homo-transfusion Group	P
Minimal temperature: mean (SD)	37.16 (±0.13)	37.14(±0.15)	>0.05
Maximal temperature: mean (SD)	37.8(±0.29)	37.95(±0.38)	<0.05
Mean temperature: mean (SD)	37.48(±0.17)	37.55(±0.24)	>0.05

2)Occurrence of post-operative chest infection:

There is no significant difference between the 2 groups. In the first group, 5 patients developed chest infection (12.19%) and in the second group 7 patients developed chest infection (14.28%). The chest infection

in both groups treated by adding mucolytic and expectorant to the post-operative broad spectrum antibiotic. Only one case in group II needed bronchodilator and anti-histaminic in addition to the previous treatment *(Table 9).*

3)Occurrence of wound infection:

in the first group, only 4 patients (9.75%) had developed wound infection while in the second group, 11 patients (22.45%) had developed wound infection *(Table 9).*

Table (9) Distribution of studied groups according to occurrence of chest and wound infection:

	Auto- transfusion group	Homo-transfusion group	P
-Chest infection No. (%)	5 (12.19)	7 (14.12)	>0.05
-Wound infection No. (%)	4 (9.75)	11(22.45)	>0.05

4) Period of wound healing

There was a significant statistical difference between the 2 groups. The mean period needed for wound healing was 12.37± 4.32 days in group I and was 15.8±6.22 days in group II *(Table 10) & (Fig 5).*

5) Postoperative intestinal motility

There was a significant difference between both groups of study in relation to time needed for return of intestinal motility post-operatively. The mean time for return of intestinal motility was 25.13 ± 13.4 hours in group I and 33.51±14.0 hours in group II *(Table 10)& (Fig6).*

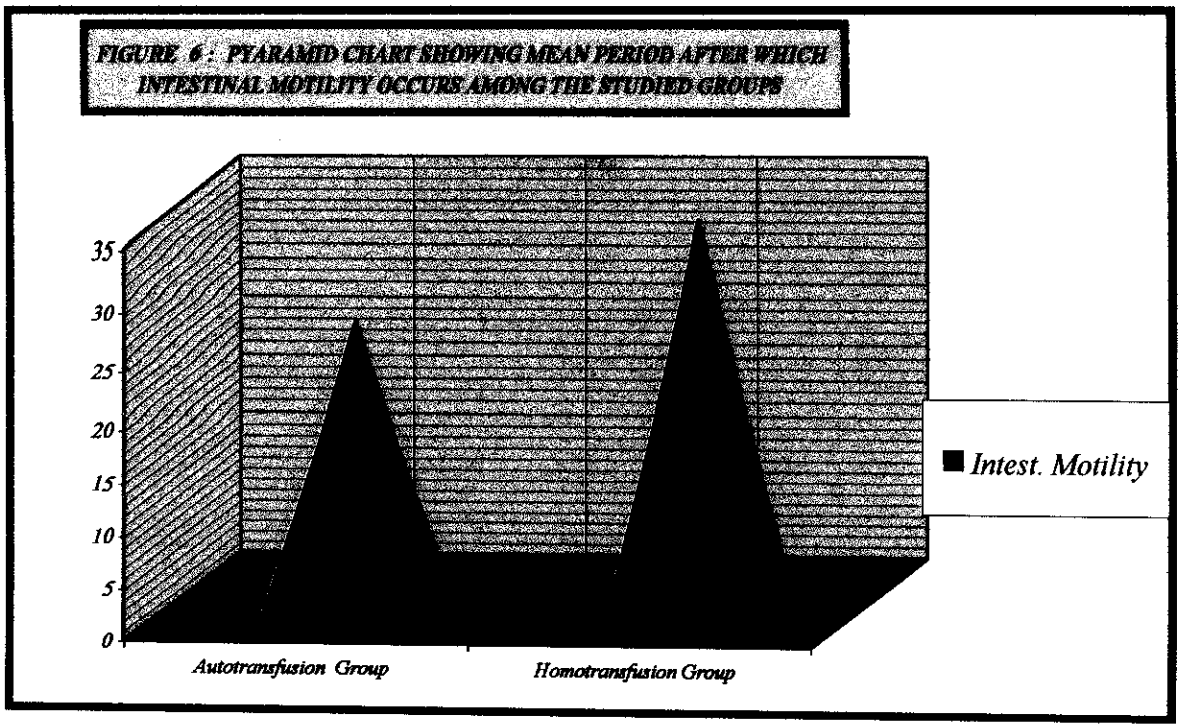


FIGURE 6 : PYARAMID CHART SHOWING MEAN PERIOD AFTER WHICH INTESTINAL MOTILITY OCCURS AMONG THE STUDIED GROUPS
35
30
25
20
15
10
5
0
Autotransfusion Group
Homotransfusion Group
Intest. Motility

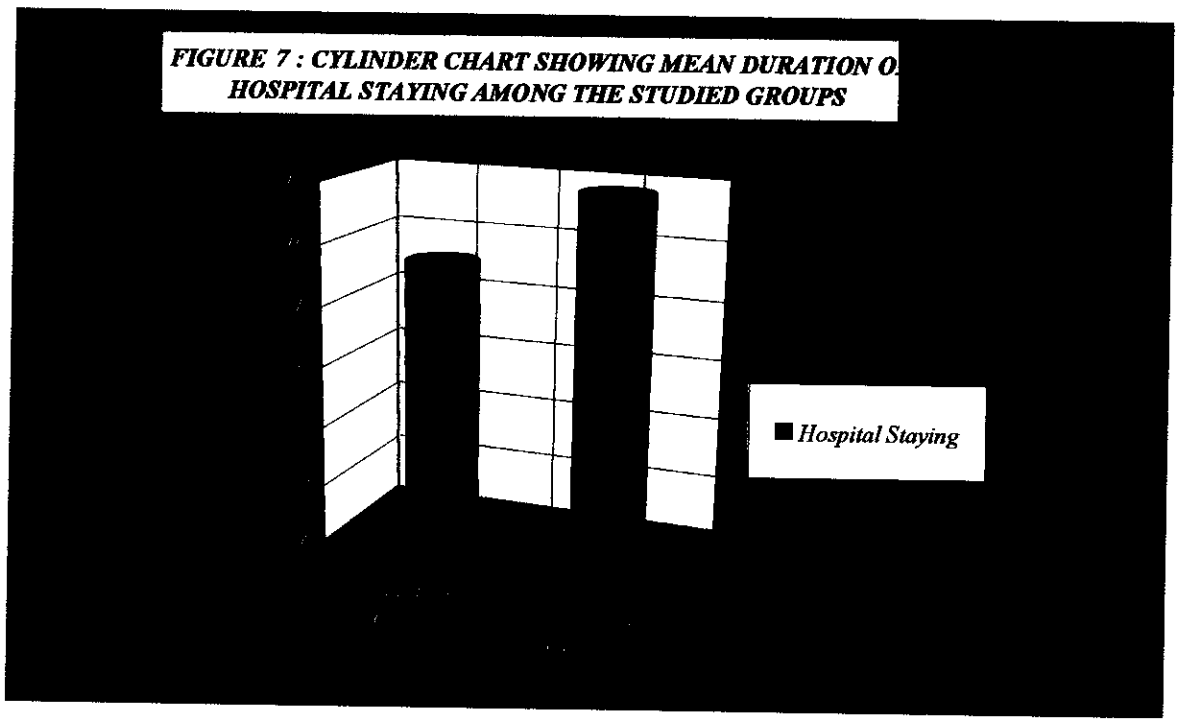


FIGURE 7 : CYLINDER CHART SHOWING MEAN DURATION O
HOSPITAL STAYING AMONG THE STUDIED GROUPS
Hospital Staying

6) Occurrence of D.V.T.

No cases reported in both groups had developed DVT. That was due to adequate hydration, early mobilization of the patient and administration of prophylactic anticoagulant in patients at risk.

7) Period of hospital staying

There was a significant difference between the 2 groups in relation to the period of hospital staying. It was 9.2±2.4 days in group I and 11.8±2.9 days in group II. *(Table 10) & (Fig 8).*

Table 10 Mean period of wound healing, intestinal motility, and hospital staying:

	Auto-transfusion group	Homo-transfusion group	T	P value
Wound healing (days)	12.36 ±4.32	15.8±6.22	3.074	<0.05
Intestinal motility (hours)	25.13±13.4	33.51±14.0	2.744	<0.05
Hospital staying (days)	9.2±2.4	11.8±2.9	4.653	<0.01

8) Liver function and renal function

There was no significant difference between the 2 groups pre and post-transfusion and also no significant difference in liver and kidney functions pre and post transfusion.

9) Bleeding time (BT) and clotting time (CT)

There was no significant difference in BT and CT between different visits (pre-donation, preoperative and one-week postoperative) in group I and also no significant difference in BT and CT between different visits (pre-operative and one-week postoperative in group II.