Hematopoetic Stem Celi Transplantation Activity at A Single Center: Cerrahpaşa Experience

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ABSTRACT

At our institution 94 transplantations have been performed in an 8 year period up to December 2001. Forty-three females and 49 males with ages ranging from 14 to 61 years received 67 allogeneic (allo) and 27 autologous (auto) transplants; 2 patients were transplanted twice. The diagnosis of allo transplants were AML (27 patients-pts), CML (17 pts), ALL (16 pts) and AA (5 pts); those of auto transplants were NHL (13 pts), HD (10 pts), MM (3 pts) and AML (l pt). Of the patients with acute leukemia 69.7% were in first CR and ali but öne of the patients with CML were in first chronic phase. Source of hematopoetic stem cells were bone marrow (BM) in 61.9% (allo 81.5%, auto 14.8%) and peripheral blood (PB) in 38.1% (allo 18.5%, auto 85.2%). Ail donors were HLA-full matched siblings with öne exception. Conditionİng regimens were BU-CY (31 pts), TBI-CY (28 pts) and Flag-lda (öne pî) for leukemia, CY-ATG for AA, CBV for lymphoma and Mel-200 for MM. Median 2.69 x 108 nucieated celIsAg (BM) and 21.7 x 106 CD34 + celIsAg (PB) were infused to allo transplant recipients; 4 patients faiied to engraft and öne patient was inevaluable due to early death. Acute GVHD was observed in 11 patients (16.9% - grade ll-IV in 10.7%) and chronic GVHD was documented in 18 patients (33.9%- extensive in 9.43%). VOD was seen in 8 patients (12.3%). Early response was CR in 91.6% in patienîs wîth leukemia; patients with lymphoma showed a 73.1% response (CR & PR) rate and 23.1% had resistant disease. So far 27.6% of the patients have relapsed ör showed progression and 45.7% have died (disease-related 27.2%, transplant-related 18.5%). At a median follow-up time of 32 months (range 0.6-96) DFS is 50.8% and OS is 53.9% in the allo transplant group. With a shorter follow-up (median 16 months, range 1-65) the same figures for the auto transplant group are 51.9 and 55.5%, respectively, in this cohort overall, OS and DFS are significantly superior in patients with early-stage disease: 71.7% vs. 26.7% in advanced-stage disease for OS and 71.4% vs. 36.8% for DFS, respectively and this trend applies to both transplant groups (p< 0.001 for ali comparisons).

Key Words: Hematopoetic stem celi transplantation, SİngIe center study.

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INTRODUCTION

Hematopoetic stem celi transplantation (SCT) is an established treatment modality for rnany types of hematological malignancies and is being increasingly used for other malignancies and some nonmalignant condiÜons as well[1]. Allogeneic SCT seems to offer the best postrernlssion treatment for acute leukemia (AL) and is the treatment of choice for CML patients with an HLA matched donorl[1]!. Autologous SCT provides better disease-free survlval for selected NHL and probably Hodgkin's disease patients and may bring true hematological complete remissions in MM[1,2]. Autologous SCT is also employed for acute leukemias and for CML and allogeneic SCT is a viable option for some patients with malignancies other than AL/CMLlll.

in our unit we began doing SCTs in December 1993 and 1994 transplantations have been performed up to December 2001. in this report we wanted to see the outcome of our activity airning to adopt any changes in our policies when deerned necessary.

MATERIALS and METHODS

Between December 1993 and November 2001, 92 patients underwent SCT in our unit; 2 patients were transplanted twice. Dlstribution of the transplants during the 8 year period according to the transplant type has been shown in Table l.

Our stem celi transplantation unit is a three-bed facility in a tertiary çare um'versity hospital; two rooms have hepa-filters whereas the third acts as an intermediary.

Conditioning regimens: Patients were conditioned with a number of different regimens depending upon individual diagnoses and availability of the particular drugs ör irradiatlon, Allogeneic transplant group were conditioned with either total body irradiation 12 Gy in six fractions över 3 days and cyclophosphamide 60 mg/kg/day for 2 days (TBI-CY), busulphan 4 mg/kg/day for 4 days and

Table 1. Distribution of SCT activity within the study period

Year	Allogeneic	Autologous	Total
1993*	1	-	1
1994	9	-	9
1995	9	-	9
1996	12	3	15
1997	9	4	13
1998	7	1	8
1999	7	7	14
2000	7	6	13
2001**	6	6	12

* December only .
**. January-November.

cyclophosphamide as above (BU-CY), öne patient received the FLAG-Ida regimen consisting of fludarabine 30 mg/rn^2/day and cytarabine 2 g/m^2/day both for 4 days, idarubicin 12 mg/m^2/day for 3 days and filgrastim 480 mcg/day for 5 days[3,5]. For patients with AA cyclophosphamide 50 mg/kg/day for 4 days and antithymocyte globulin 30 mg/kg/day for 3 days (CY-ATG) were administered[6]. NHL and HD patients received the CBV regimen: Cytarabine 1.7 g/m^2/day and etoposide 400 mg/m^2/day both for 4 days and carmustine 150 mg/m^2/day on the first, and 100 mg/m^2/day on the following 3 dayst[7]. Melphalan 200 mg/m^2 were given to patients with MMl[8]L The öne patient with AML who underwent autologous SCT received the BU-CY treatment.

Bone marrow harvests: Bone marrow was aspirated from posterior iliac crests of donors and patients under general anesthesia. Target total leukocyte count was a minimum of 2 x 10^8/kg.

Mobilization regimens: Patients with NHL and HD were mobilized with the dexa-BEAM regimen consisting of dexamethasone 24 mg/day, carmustine 60 mg/m^2/day and melphalan 30 mg/m^2/day for öne day, etoposide 75 mg/m^2/day and cytarabine 200

mg/m^2/day for 4 dayst[9]. And patients wlth MM with 5 g/m^2 of cyclophosphamidel[8]. These were followed by filgrastını in ali patients until the last day of peripheral blood stern celi collection. Patients were leukapheresed beginning on the day their WBC count surpassed l x 10^9/1 until the minimum target value of 2 x 10^6/kg CD 34 + cells has been reached.

Stem celi cryopreservatiou and reinfusion: Collected stem cells were kept at -180°C in liquid nitrogen after processing with DMSO and freezing using a programmed-rate freezer. Before reinfusion the graft was rapidly thawed in a 37°C water bath.

Allogeneic peripheral blood stem celi collection: Donors undenvent daily aphereses beginning on the fourth day of 2 x 8 mcg/kg/day of s.c. G-CSF treatment until the minimum target value of 2 x 10^6/kg CD 34 + cells has been reached.

GVHD prophylaxis, diagnosİs: For GVHD prophylaxis allogeneic transplant recipients received the combination of cyclosporin and short course methotrexate, according to the Seattle protocol![10]. The diagnosis and severity of acute GVHD was defined according to the Seattle criteria; the diagnosis and extent of chronic GVHD was based on clinicopathological groundsl[11•12].

Supportive çare: Ali patients had central venous catheters and were isolated in hepafiltered units ör reverse isolation roorns until at least a durable engraftment. They received topical and oral decontamination treatment and prophylactic cotrirnoxazole, fluconazole, acyclovir and a systemic antibacterial were administered. Cytokines posttransplant were administered on demand in the allogeneic setting but routinely given to autologous transplant patients. Transfusions of RBCs and apheresis platelets from random donors were given to maintain hemoglobin levels above 70-80 g/L and platelet count above 20 x 10^9/L. Ali blood products were leukocyte-filtered and/or irradiated.

Criteria for response and survival: Treatment outcome was evaluated in terms of response (CR for allogeneic transplants and CR & PR for autologous transplants), duration of survival and treatment-related toxicity. CR, PR and resistant disease were defined as usual. Survival was measured in terms of overall survival (OS) and disease-free survival (DFS) which were calculated from the day O of SCT and the first day of documented response, respectively. Engraftment times were defined as the first day posttransplant on which durable and unsupported peripheral blood values have been reached; WBC count > 1.0 x 10^9/L and platelet count > 50 x 10^9/L.

Statistical analysis: Differences in proportions were analyzed using the Chi-square test; differences with p values < 0.05 were considered significant. Survival and remission duration distributions were estimated using the Kaplan-Meier method and compared using the log-rank test. Statistical analysis was partially carried out using the SPSS software package[13-14].

RESULTS

Patient characteristics are presented in Tables 2, 3 and 4. Overall, the 92 patients ranged in age from 14 to 61 years, with a median age of 28 years; patients in the allogeneic transplant group were younger compared to the autologous transplant group. Overall, sex distribution was about even, but there were more female patients in the allogeneic transplant group while the opposite was true for the autologous transplant group. More patients in the autologous transplant group were in advanced stages of their diseases. Patients received allogeneic transplants earlier than the autologous transplants.

in the allogeneic transplant group, patients in the CML group were older than the othergroups. Distribution of early vs. advanced cases were similar in the AML and ALL groups whereas the majority of the CML group were in first chronic phase. Time to transplant was around öne year except AA for which the median was 2 months.

Table 2. Patient characteristics

	Allogeneic	Autologous	Total
No of patients	65	27	92
Gender, female/male	38/27	5/22	43/49
Age in years, median (range)	24 (14-44)	34.5 (15-61)	28 (14-61)
Diagnosis			
AML	27	1	28
ALL	16	-	16
CML	17	-	17
AA	5	-	5
NHL	-	13	13
HL	-	10	10
MM	-	3	3
Disease status*			
Early (1. CR, 1. CP, PR)	46 (76.7)	8 (33.3)	54 (64.3)
Advanced	14 (23.3)	16 (66.7)	30 (35.7)
Time from diagnosis to SCT,			
in months, median (range)	13 (1-84)	16 (6-101)	13 (1-101)

* *Concerning patients with AML, ALL, CML, NHL and HL; patients with AA and MM are excluded.*

Table 3. Patient characteristics of individual diseases in the allogeneic transplant group

	AML	ALL	CML	AA
No of patients	27	16	17	5
Gender, female/male	15/12	8/8	13/4	2/3
Age,				
in years, median (range)	24 (16-40)	21 (14-42)	35 (17-44)	23 (17-32)
Disease status, no. (%)				
Early	18 (66.6)	11 (68.7)	16 (94.1)	*
Advanced	9 (33.3)	5 (31.2)	1 (5.9)	*
Time to transplant,				
in months, median (range)	11 (3-22)	13 (6-30)	13 (4-84)	2 (1-2)

* Not relevant.

Table 4. Patient characteristics of individual diseases in the autologous transplant group

	NHL	HL	MM	AML
No. of patients	13	10	3	1
Gender, female/male	3/10	1/9	1/2	0/1
Age,				
in years, median (range)	33 (15-54)	25 (18-38)	43, 47, 61	20
Disease status, no (%)				
Early	5 (38.5)	2 (20.0)	*	1 (100.0)
Advanced	8 (61.5)	8 (80.0)	*	-
Time to transplant,				
in months, median (range)	13 (6-39)	30 (10-101)	11, 27, 35	7

* Not relevant.

The autologous transplant group included significantly rnore male patients. in the Hodgkin's disease group, which consisted of younger patients than the NHL group, there were more patients in advanccd stages and the time to transplant was markedly longer than the latter.

Transplant data are shown in Tables 5 and 6. Ali but öne of the 65 patients received allogeneic grafts frorn HLA-A, B and DR genotypically identical, MLC-nonresponsive siblings. One patient received her graft from an HLA full-matched cousin. Donors for both female and male patients showed an equal distribution of both sexes. For conditioning the BU-CY and TBI-CY regimens were used in similar proportions of the allogeneic transplant group; but patients with ALL received the TBI-CY regimen preferentially. The HSC source was bone rnarrow for the majority of the allogeneic group whereas in the autologous group peripheral blood was used exceedingly. The usage of bone marrow vs. peripheral blood was similar in the AML and CML groups but more patients wim ALL received peripheral blood. Medians of 2.69 (range 1.20-3.98} x 10^8/kg marrow cells and 21.7 (range 7.5-141.0) x 10^6/kg CD34 + cells were infused. Follow up is longer in the allogeneic transplant group with a median of 32 months (range 0.6-96) than the autologous transplant group for which the respective values are 13 months (range 1-65).

Engraftment: in the allogeneic transplant group primary engraftment was not observed in 5 patients who died in the early posttransplant period (7.69%) whereas ali patients in the autologous transplant group showed early reconstitution. Median leukocyte recovery (WBC count > î x 10^9/L) was on day 23 (range 12-46) in the allogeneic transplant group and on day 10 (range 6-31) in the autologous transplant group. Within the allogeneic transplant group peripheral blood as a source of HSCs yielded earlier recovery compared to bone marrow, medians are 18 days vs 23 days respectively. Since there were only 3 patients who received BM

Table 5. Transplant data of the transplant groups

	No. (%)
Allogeneic SCT	
Patient-donor match	
F-F	20 (52.6)
F-M	18 (47.4)
M-M	13 (48.1)
M-F	14 (51.9)
Conditioning regimen	
BU-CY	31 (47.7)
TBI-CY	28 (43.0)
FLAG-IDA	1 (1.5)
ATG-CY	5 (7.7)
HSC source	
Bone marrow	53 (81.5)
Peripheral blood	12 (18.5)
HSC dose, median (range)	
Bone marrow (x 10^8/kg/kg,TNC)	2.69 (1.20-3.98)
Peripheral blood	21.7 (7.5-141.0)
(x 10/kg, CD34 +)	
Follow-up, in months	
Median (range)	32 (0.6-96.0)
Autologous SCT	
Conditioning regimen	
CBV	23 (85.2)
MEL-200	3 (11.1)
TBI-CY	1 (3.7)
HSC source	
Bone marrow	4 (14.8)
Peripheral blood	23 (85.2)
HSC dose, median (range)	
Bone marrow (x 10/kg, TNC)	3.3 (2.4-3.5)
Peripheral blood (x 10/kg, CD34 +)	12.2 (3.3-45.9)
Follow-up, in months	
Median (range)	13 (1-65)

Table 6. Transplant data for hematological malignancies in the allogeneic SCT group

	AML	ALL no (%)	CML
Conditioning regimen			
BU-CY	17 (63.0)	3 (18.7)	11 (64.7)
TBI-CY	9 (33.3)	13 (81.3)	6 (35.3)
FLAG-IDA	1 (3.7)	-	-
Disease status			
Early stage	19 (70.4)	11 (68.8)	16 (94.1)
Advanced stage	8 (29.6)	5 (31.2)	1 (5.9)
HSC source			
Bone marrow	22 (81.5)	11 (68.8)	15 (88.2)
Peripheral blood	5 (18.5)	5 (31.2)	2 (11.8)

as HSC source in the autologous transplant group subgroup analysis was not done. Median platelet recovery was seen on day 26 (range 12-57) in the allogeneic transplant group and on day 13 (range 9-38) in the autologous transplant group. Platelet engraftment was again faster in the PB subgroup with a median of 23 days versus 26 days than the BM subgroup.

Response: The response (CR) rate for the allogeneic transplant group was 90.8%, there was only öne refractory patient along with 5 early deaths. On the other hand, response (CR & PR) was inferior in the autologous transplant group (73.1%) with 23.1% resistance and öne toxic early death (Table 7).

Relapse/progression: So far, 27.6% of patients have relapsed ör progressed; 27.3% in the allogeneic transplant group relapsed and 28.6% in the autologous transplant group relapsed/progressed (Table 8). Patients developing acute GVHD seemed to relapse less than those who do not develop this complication while patients with AML, with

Table 7. Early outcome in allogeneic and autologous transplant groups

a. Allogeneic transplant group

	AML n: 27	ALL n: 16	CML n: 17	AA n: 5	Total n: 65
CR	25 (92.6)	15 (93.8)	15 (88.2)	4 (80.0)*	59 (90.8)
Refractory	1 (3.7)	-	-	-	1 (1.5)
Early death	1 (3.7)	1 (6.2)	2 (11.8)	1 (20.0)	5 (7.7)

b. Autologous transplant group

	NHL n: 13	HL n: 10	MM n: 2**	AML n: 1	Total n: 26**
CR	5 (38.5)	8 (80.0)	1 (50.0)	1 (100.0)	15 (57.7)
PR	2 (15.4)	2 (20.0)	-	-	4 (15.4)
Refractory	6 (46.1)	-	-	-	6 (23.1)
Early death	-	-	1 (50.0)	-	1 (3.8)

* CR: Response for AA.

** One patient is too early to evaluate.

advanced-stage disease and those receiving peripheral blood as HSC source relapsed more frequently. Forty percent of the AML group and 26.7% of the ALL group relapsed within 18 months at a rnedian of around 5 months. The relapse rate is significantly lower in patients allografted in first CR compared to patients with advanced stage (17.6 vs 48.0%). After attempts of salvage including withdrawal of immunosuppression, chemotherapy, donor leukocyte infusions (DLI) and interferan treatment ali but öne pati ent with acute leukemla have died l to 38 months following relapse; the remaining patient is in continuous second CR at 78 months. in öne patient with CML cytogenetic relapse was observed at 56 months; she attained a second remission after two courses of DLI. in the autologous transplant group two patients with HD relapsed after CR at 6 and 15 months; the former patient died at 18 months whereas the latter is alive with disease at 30 months posttransplant. One patient with HD and two patients with NHL progressed after attaining PR and ali died of their diseases. The öne patient with AML who undenvent autologous SCT relapsed at 3 months and received an urirelated SCT but ultimately succumbed to his disease.

Survival (Fİgures l- 6): With a median follow-up tirne of 16 months (0.6-96) the overall survival (OS) rate for ali patients is 54.3%. OS is 53.9% in the allogeneic transplant group [median follow-up: 32 months (0.6-96)1 and 55.5% in the autologous transplant group with a median follow-up time of 13 months (1-65). in univariate analysis, bone marrow as the HSC source, early-stage disease and absence of acute GVHD were the factors associated with significantly better survival while conditioning regimen, chronic GVHD and VOD did not have a differential influence (Table 9). in this cohort overall, for patients in early-stage disease, OS is 71.7%, and for patients receiving their HSC in advanced stage it is 26.7%; this trend applies to both transplant groups: 69.6 vs. 7.1% for the allogeneic transplant group and 85.7 vs. 43.7% for the autologous transplant group ($p< 0.001$ for ali comparisons). OS is significantly better for CML in the allogeneic transplant group and for HD in the autologous transplant group ($p< 0.001$ for both).

Disease-free survival (DFS) is again similar in both transplant groups overall, albeit with different follow-up durations, 50.8% and 51.9% in allogeneic and autologous groups respectively; but differs between disease subsets. DFS is significantly better for CML in the allogeneic transplant group and for NHL in the autologous transplant group ($p< 0.001$ for both). in univariate analysis, bone marrow as the HSC source, early-stage disease, absence of acute GVHD and TBI-CY as the conditioning regimen were the factors associated with significantly better survival while chronic GVHD and VOD did not have a differential influence (Table 9).

Transplant-related toxicity: Acute GVHD was documented in 16.9% in the allogeneic transplant group (grades II-IV in 10.7%). Chronic GVHD was diagnosed in 33.9% of those at risk and in 9.43% it was extensive. VOD was observed in 12.3% of the patients (Table 10).

Table 8. Relapse figures in the allogeneic transplant group

No with response*	AML n: 25	ALL n: 15	CML n: 15	Subtotal n: 55	AA n: 4	Total n: 59
No (%)	10 (40.0)	4 (26.6)	1 (6.6)	15 (27.3)	-	15 (25.4)
Time to relapse, in months, median (range)	5.5 (2-17)	4.5 (3-18)	56 (-)	5 (2-56)	-	5 (2-56)

* CR for AML, ALL and CML.

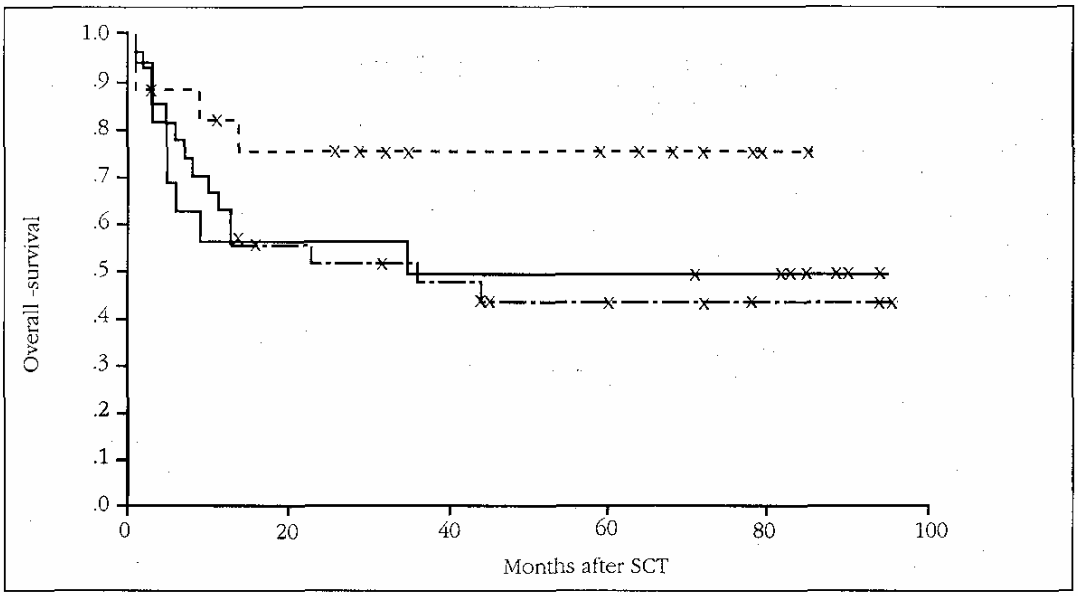

Figure 1. Overall survival of patients with leukemia after allogeneic SCT according to diagnosis (Lines represent: CML ----, ALL and AML). Cumulative proportion of the patients surviving after transplant. Survival was calculated in months after transplant. Each cross represents a patient being alive at that time. Difference in OS between patients with CML and ALL/AML was highly significant ($p< 0.001$).

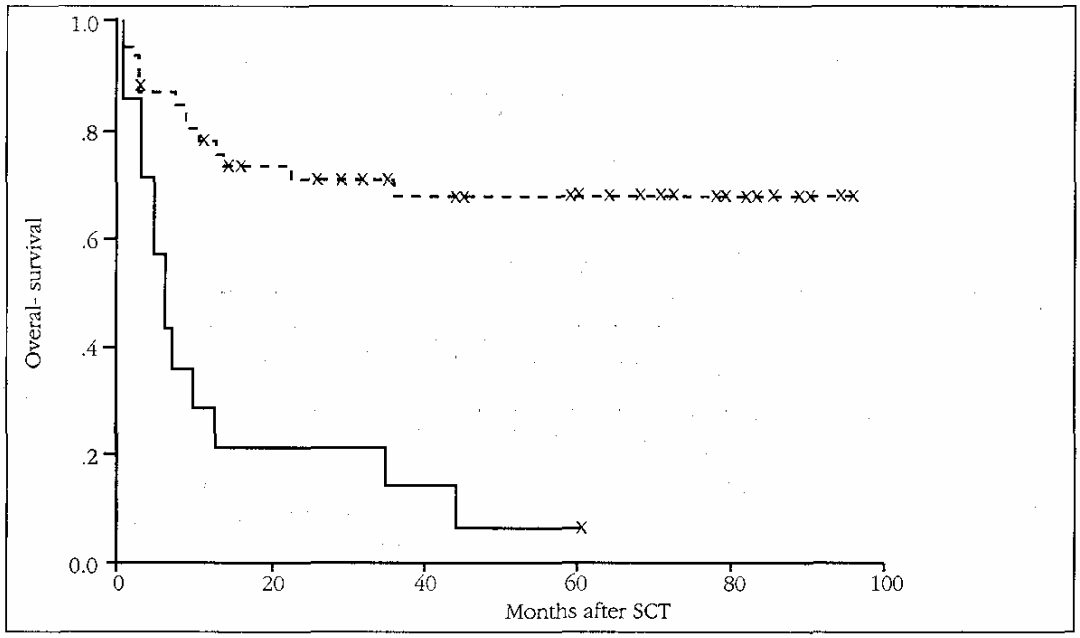

Figure 2. Overall survival of patients with leukemia after allogeneic SCT according to disease status at transplant (Lines represent: Early-stage ---- and advanced-stage). Cumulative proportion of the patients surviving after transplant. Survival was calculated in months after transplant. Each cross represents a patient being alive at that time. Difference in OS between patients transplanted in early stages and advanced stages was highly significant ($p< 0.001$).

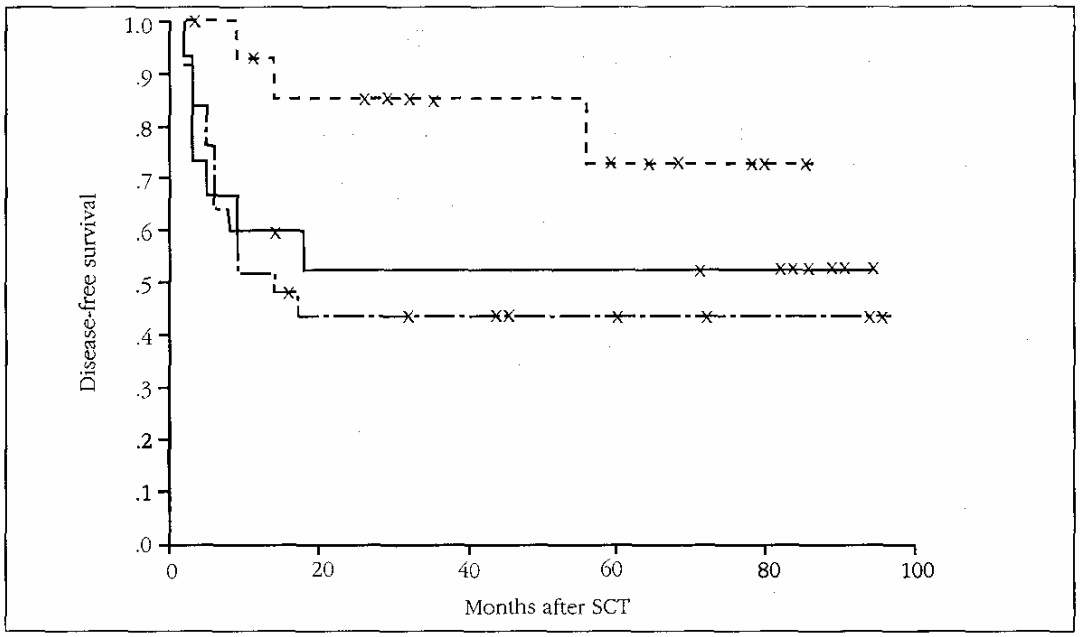

Figure 3. Disease-free survival after allogeneic SCT according to diagnosis (Lines represent: CML ----, ALL and AML). Cumulative proportion of the patients surviving after transplant. Survival was calculated in months after CR was documented. Each cross represents a patient being alive at that time. Difference in DFS between patients with CML and ALL/AML was highly significant ($p< 0.001$).

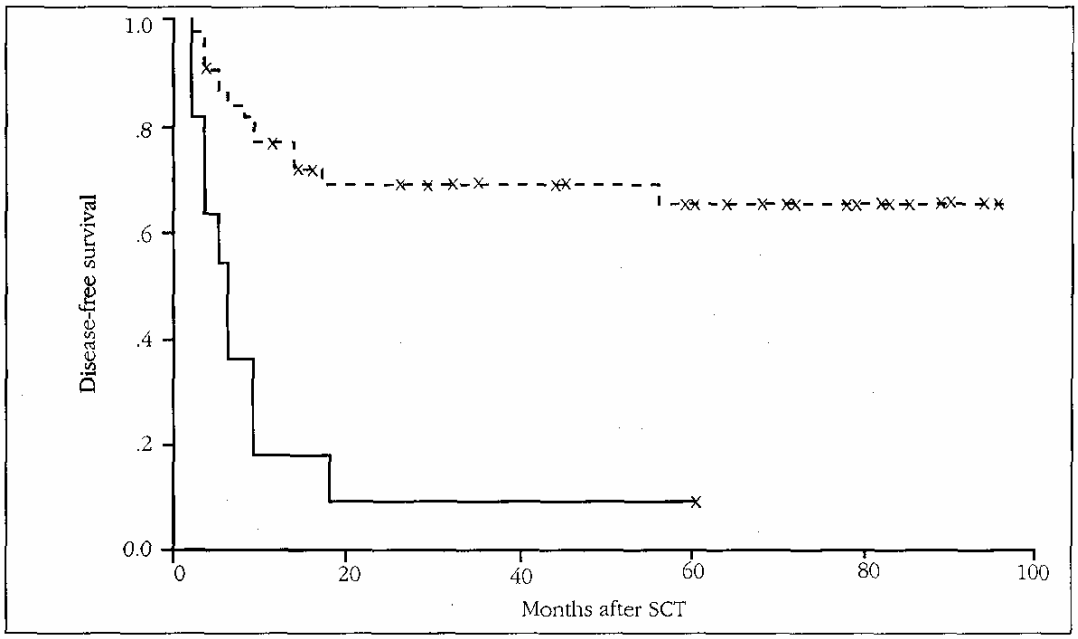

Figure 4. Disease-free survival after allogeneic SCT according to disease status at transplant (Lines represent: Early-stage ---- and advanced-stage). Cumulative proportion of the patients surviving after transplant. Survival was calculated in months after CR was documented. Each cross represents a patient being alive at that time. Difference in DFS between patients transplanted in early stages and advanced stages was highly significant ($p< 0.001$).

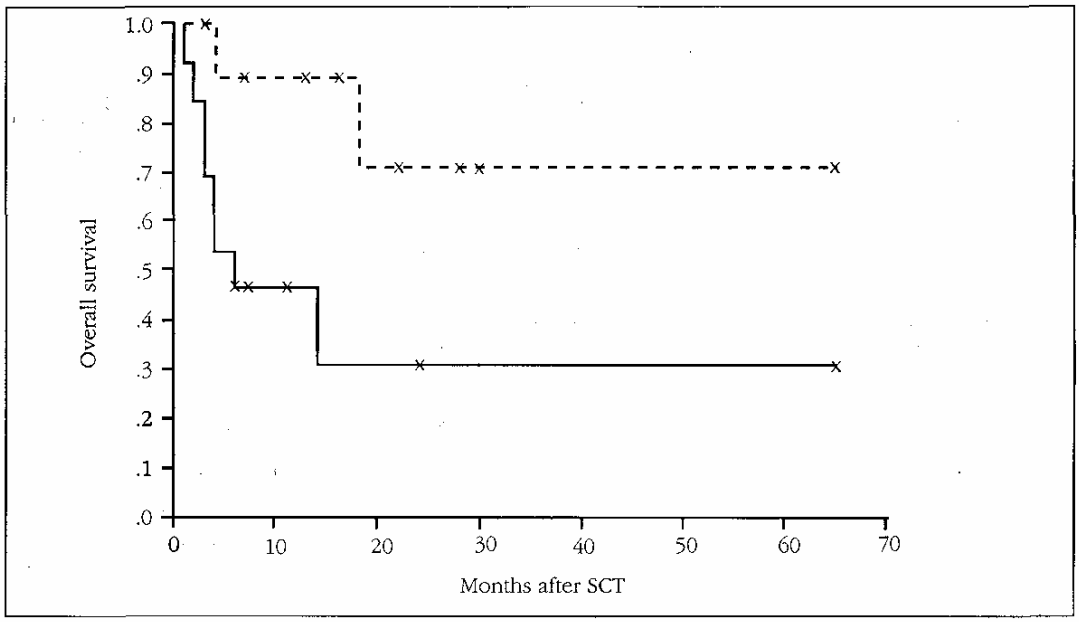

Figure 5. Overall survival of patients with HD and NHL after autologous SCT according to disease status at transplant (Lines represent: Early-stage ---- and advanced-stage). Cumulative proportion of the patients surviving after transplant. Survival was calculated in months after transplant. Each cross represents a patient being alive at that time. Difference in OS between patients transplanted in early stages and advanced stages was highly significant ($p< 0.001$).

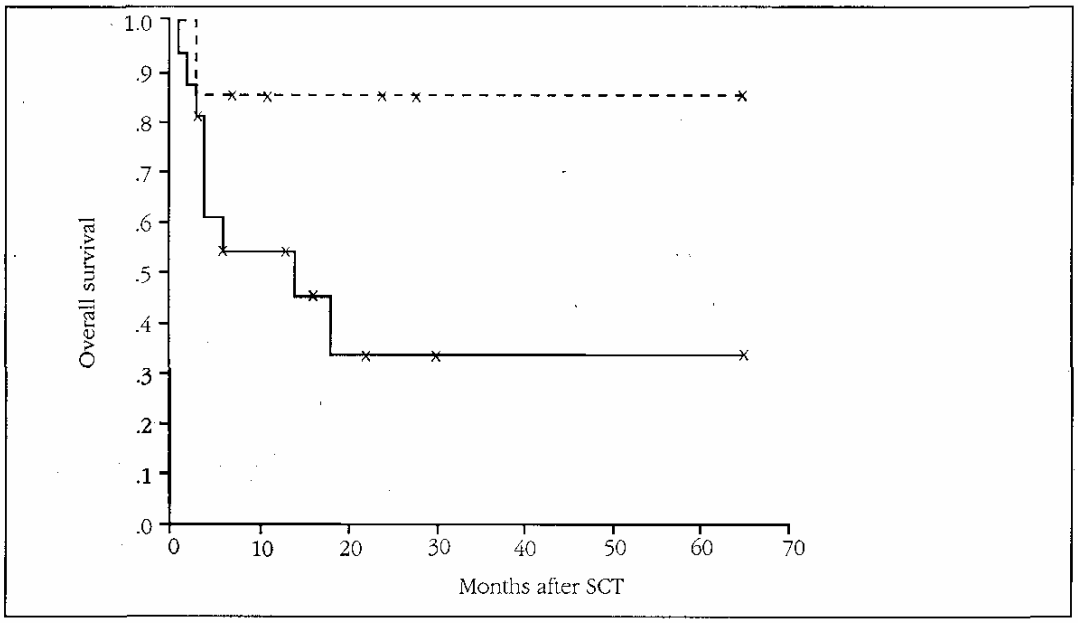

Figure 6. Overall survival of patients with HD and NHL after autologous SCT according to diagnosis (Lines represent: HD ---- and NHL). Cumulative proportion of the patients surviving after transplant. Survival was calculated in months after CR was documented. Each cross represents a patient being alive at that time. Difference in OS between patients with HD and NHL was highly significant ($p< 0.001$).

Table 9. Treatment outcome in relation to different disease-or transplant-related factors

	OS		DFS		RR	
a. Allogeneic transplant group						
Entire hematological malignancies	53.8		50.8		25.4	
Diagnosis						
AML	44.4	NS	44.0	NS	40.0	< 0.02
ALL	50.0		53.3		26.7	
CML	76.5	< 0.001	80.0	< 0.001	6.7	< 0.001
Disease status						
Early	69.6	< 0.001	68.1	< 0.001	18.2	< 0.001
Advanced	7.1		9.1		63.6	
HSC source						
BM	62.6	< 0.001	62.2	< 0.001	24.0	< 0.001
PB	25.0		30.0		44.4	
Conditioning regimen						
TBI-CY	60.7	NS	65.4	< 0.05	26.9	NS
BU-CY	51.6		50.0		25.0	
Acute GVHD						
Present	30.0	< 0.01	42.9	< 0.02	12.5	< 0.001
Absent	60.0		60.4		29.8	
Chronic GVHD						
Present	65.0	NS	60.0	NS	20.0	NS
Absent	67.9		66.7		28.6	
b. Autologous transplant group						
Entire group	55.6		51.9		28.6	
Diagnosis						
NHL	38.5	< 0.001	100.0	< 0.01	28.6	NS
HL	80.0		75.0		30.0	
Disease status						
Early	85.7	< 0.001	n.r.		n.r.	
Advanced	43.7					

* OS: Overall survival, DFS: Disease-free survival, RR: Relapse risk, NS: Not significant, n.r.: Not relevant.

The overall probability of transplant-related mortality (TRM) in the allogeneic transplant group was 24.6%, and 3.7% in the autologous transplant group. Leading causes of TRM in the allogeneic transplant group were infections (7 pts) and GVHD [6 pts) followed by VOD (2 pts) and hemorrhage (l pt). While relapsed ör resistant disease was the main cause of death in the autologous transplant group (91.7%), reasons for death differed among disease subsets in the allogeneic transplant group. in patients with CML and AA death was the result of transplant-related causes in ali, whereas of patients with AML

Table 10. Transplant-related complications in allogeneic transplant group

Acute GVHD	11 (%16.9)
Grade I	4
Grade II	5
Grade III	1
Grade IV	1
Chronic GVHD	18 (%37.2)
Limited	13
Extensive	5
VOD	8 (%12.3)
Mild	4
Moderate	2
Severe	2

and ALL, 66.7% and 50.0%, respectively, died of their diseases (Table 11).

DISCUSSION

Our results generally agree with the published data on the efficacy of transplantation[15]. Allogeneic HSCT is a very effective treatment for patients with ALL, AML and CML allografted at early stages of their diseases. in this cohort, 55.5-72.2% of patients with acute leukemia in first CR and 80.0% of patients with CML in first chronic phase have become long-term survivors.

Relapse is stili a majör problem after allogeneic SCT[16-17]. Of our patients with acute leukemia, 9.1-33.3% in first CR and 57.1-75.0% with advanced-stage disease relapsed. Majority of relapses were observed early after transplant, at a median of 5 months. Relapse was also the main cause of death. in contrast, in CML, only öne late cytogenetic relapse was observed at 56 months and the patient entered into a second remission.

Although the survival of patients with AA is sornewhat inferior, the small size of the subgroup precludes any firm conclusions other than a trend for a higher risk of TRM for this diagnosis.

GVHD and infections were the most frequent complications of allogeneic SCT. The incidence of acute GVHD is lower than the data of large registries whereas the chronic GVHD incidence is within the reported ranges[i8,i9]. GVHD with ör without infection was a common cause of death in our group.

The TRM of allogeneic SCT was between 18.5-23.5% for hematological malignancies but sornewhat higher for AA [60.0%). The low number of patients in each subgroup do not allow us to speculate the role of diagnosis and the impact of disease stage.

Keeping the small nurnbers of each patient groups and relatively short follow-up periods in mind can any conclusion be drawn from our autologous SCT experience? The very low rate of TRM and the relatively favorable disease-free survival figures may lead öne to propose this modality to any patient with unsatisfactory results after conventional treatment. it is clearly an option at least

Table 11. Distribution of mortality figures within transplant groups and diagnoses

	% of total (% of share)		
	Overall	**Transplant-related**	**Disease-related**
Entire group	45.7 (100.0)	18.5 (40.4)	27.2 (59.5)
Autologous	44.4 (100.0)	3.7 (8.3)	40.7 (91.7)
Allogeneic	46.1 (100.0)	24.6 (53.3)	21.5 (46.7)
AML	55.5 (100.0)	18.5 (33.3)	37.0 (66.7)
ALL	50.0 (100.0)	25.0 (50.0)	25.0 (50.0)
CML	23.5 (100.0)	23.5 (100.0)	0.0 (0.0)

for some patients but the cost of the treatment should be taken into account. If not considered preliminary, the inferior response rate (53.9%) in NHL suggests for an alternative myeloablative regimen other than CBV for this diagnosis. On the other hand the 100% DFS rate in this subgroup rnakes this a rather difficult decision and leads us to think that chemosensitivity of individual patients should have been more important in this outcome.

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