

出國報告

(出國類別：參加國際研討會)

參加第 15 屆國際肢體保留手術討論會

服務機關：行政院國軍退除役官兵輔導委員會台北榮民總醫院骨科部

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派赴國家：Boston Massachusetts U.S.A

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摘要

以半皮質骨切除及骨移植重建來治療高度惡性骨肉瘤

- 目的：我們於切除骨肉瘤時保留更多的健康皮質骨，縮短安全距離(1 公分)，之後評估其臨床功能。
- 方法：於 2002 年 8 月至 2007 年 4 月，六位病患以本方法治療，5 位病灶在膝蓋，1 位在遠端脛骨。
- 結果：平均骨骼肌肉協會分數為 93 分，平均追蹤時間為 35 個月，所有骨移植皆癒合。
- 結論：在適當挑選病人後，以本方法治療可得到令人滿意的成果。不過仍需要更多的病例和更長遠的追蹤。

以保留生長板及生物性重建在治療膝關節高度惡性骨肉瘤

- 目的：廣泛性切除及肢體保留手術為目前治療骨肉瘤之主要方法。我們以保留生長板及關節軟骨之技術來治療一些特定的病患。
- 方法：自 1994 年 1 月至 2006 年 6 月，共 15 位病患接受此方法治療，
- 結果：所有病患肢體皆獲得保留，平均功能分數為 27.9 分(滿分為 30)。
- 結論：在慎選病人的狀況下，以保留未受侵犯之生長板及關節軟骨來治療病患可以得到滿意的結果，不過仍需更多的病例及更長遠的追蹤。

關鍵字：惡性骨肉瘤

目的

學術交流

過程

於 9 月 23 日會議第一天發表口頭論文報，告並 9 月 23~26 日大會期間全程展示兩篇壁報論文。

心得

國際肢體保留手術討論會，是全球骨骼肌肉系統腫瘤領域最重要之會議，每兩年舉辦一次，每次均由全球不同國家輪流舉辦，此屆為第 15 屆，總共超過一千位來自全球的專家與會，此次會中口頭論文共 197 篇、壁報論文 142 篇，幾乎全世界知名之大師均與會，由於只有一個大會議室，您可聽到所有的文章並且可以讓其他國家之專家看到台灣目前於此領域之努力。此次會議台灣共發表 3 篇口頭論文及兩篇壁報論文，而台北榮總佔其中四篇，另一篇由中國醫藥大學所發表，論文總數於亞洲國家僅次於日本及中國(下一屆主辦國)，就單一醫院發表數量，台北榮總於亞洲僅次於日本金澤大學。

職 之口頭論文於會議第一天上午第 13 個題目報告，發表主題為 Hemicortical resection and Biological Reconstruction 治療高度惡性骨肉瘤，由於病患臨床效果極佳，為全球目前文獻尚未發表之新方法，會中引起高度注意及熱烈討論並獲邀發表於骨科知名雜誌(CORR)，讓全世界知名骨腫瘤大師看見台灣是我們最大收穫。

此外，此次大會職 已學到許多骨盆骨癌手術及肢體重建之新觀念，更藉由會議之交流認識許多知名大師，也經他們的幫忙同意本屆開始亞太骨骼肌肉系統腫瘤學會理事多一席給台灣台北榮總，希望台北榮總能對全球骨骼肌肉系統提供更多之貢獻，並期望日後能爭取兩年一次之亞太骨骼肌肉系統研討會於台灣舉行。

此次會議對職 而言是一趟豐富之旅，有由此會議更知道我們日後需進一步努力之方向，以期不辜負全台灣百分之五十左右於台北榮總治療之骨癌病患。

建議事項

1. 台灣目前骨癌治療之人工關節設計遠弱於歐美，應急起直追。
2. 台灣應多參加國際會議，要多爭取在台舉辦之主辦國機會。



Innovative Trident Fixation Technique for Allograft Knee Arthrodesis for High-grade Osteosarcoma around the Knee

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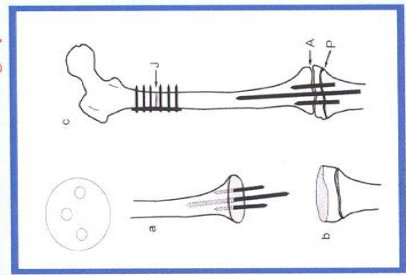
Hypothesis

Reconstruction for osteosarcoma around the knee after wide resection faces the challenge of great bone defect and future limb length discrepancy in the skeletally-immature patients. Modern prosthetic reconstruction may provide good results, but the longevity may be of concern. They may not be affordable in certain communities. Allograft knee arthrodesis still has its role in light of bone stock preservation and cost-effectiveness.

Methods

We developed the innovative trident fixation technique utilizing 3 Steinmann pins to minimize limb length inequality without jeopardizing knee fusion stability. 12 patients were enrolled. The mean age was 11.5 (10-13) years. Two had high grade osteosarcoma in proximal tibia and others in distal femur. All patients were followed every 6 weeks postoperatively for healing of the allograft-host junctions, functional status and complications until bony union and then every 3 months.

Illustration of the surgery



Illustrated assuming tumor in distal femur. (a) The three entry points of the trident are like three apexes of a triangle. Smooth surfaces were prepared at both ends of the allograft bone strut. Three parallel pins were inserted as three borders of a triangular prism, halfway inside the allograft. (b) The proximal tibia was prepared with TKA instruments to create a smooth surface of cancellous bone exposure. (c) The other halves of the pins were hammered inside the proximal tibia to complete the arthrodesis. The proximal allograft-host junction was secured with single or double dynamic compression plates. (J: allograft-host diaphyseal-diaphyseal bone junction, A: knee arthrodesis metaphyseal-diaphyseal junction site, P: the remaining metaphysis of the uninvolved side of the knee).

Conclusions

This straightforward technique was successful in knee arthrodesis with minimized limb length inequality. Accordingly, in light of bone stock preservation and longevity for the young children, it may be a surgical alternative for malignant bone tumors around the knee.

Table 1. Details of the 12 patients who had knee arthrodesis by trident fixation technique for osteosarcoma around the knee

Case	Gender	Age (yrs)	Location	Surgical stage*	Follow-up (mths)	limb Length discrepancy (cm)	Oncological Result	Time to union, knee arthrodesis site (M-M) (weeks)	Time to union, allograft-host junction (D-D) (weeks)
1	M	13	Distal femur	IIIB	60	2.1	NED	24	36
2	M	13	Distal femur	IIIB	20	N/A	DOD	24	42
3	F	11	Distal femur	IIIB	45	1.4	NED	18	30
4	M	11	Distal femur	IIIB	50	1.6	NED	18	36
5	M	10	Distal femur	III	28	N/A	DOD	18	30
6	M	12	Proximal tibia	IIIB	41	1.1	NED	24	36
7	M	11	Proximal tibia	IIIB	47	1.2	NED	18	30
8	M	10	Distal femur	IIIB	45	1.5	NED	18	36
9	F	11	Distal femur	IIIB	47	1.3	NED	18	30
10	F	13	Distal femur	IIIB	41	1.0	NED	30	42
11	M	13	Distal femur	IIIB	51	1.4	NED	30	36
12	M	10	Distal femur	IIIB	55	1.9	NED	24	36
Mean		11.5			47*	1.45		22	35

NED: no evidence of disease, DOD: die of disease
M-M: metaphyseal-metaphyseal junction, D-D: diaphyseal-diaphyseal junction
* Median instead of Mean, excluding two expired patients

Table 2. Details of functional outcome

Case	Mean Enneking Function score (%)	Time to walking, without assistance (mths)
1	77	12
2	73	12
3	90	9
4	90	9
5	N/A	Never
6	80	12
7	82	9
8	90	12
9	80	12
10	75	12
11	73	9
12	86	12
Mean	81.5	10.9



Pre-operative X-ray of a 11-year-old female. Osteosarcoma involving right distal femur was found. Enneking stage IIB



The prepared allograft bone strut with three parallel pins cemented halfway inside, ready for reconstruction. The central pin is thicker and longer, acted as an intramedullary nail. The other two pins provide an additional stability, especially anti-rotational force.



Thirty-week post-operative X-ray showed union of both knee fusion site and proximal allograft-host bone junction.



Prognostic Indicators of Grafting for Bone Defects after Curettage of Low-invasive Benign Bone Tumors

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Hypothesis

Benign bone tumors often weaken the bone and predispose the patient to pathological fractures. Curettage of the tumor and re-infilling of the bone defects are necessary to prevent these potential complications. The objective of this study was to assess the influence of various factors in treating benign, low-invasive bone tumors after curettage and infilling with bone graft. We evaluated the process of final defect healing and the time taken to achieve a stable healing status.

Methods

We performed a retrospective analysis of 84 patients with benign, low-invasive bone tumors (simple bone cyst [$n=36$] and fibrous dysplasia [$n=48$]) who were treated between June, 1997 and January, 2008. The following variables were evaluated: age, gender, location, histology, tumor length, graft type, and the degree of graft infilling. The post-operative incorporation results were evaluated using Neer's classification, with the levels of incorporation classified as complete healing, incomplete healing and recurrence. The time taken to heal was also recorded.

Results

Three variables correlated significantly with prognosis, tumor length, graft type and the degree of infilling.

Table 1. Factors and healing status

	Complete	Incomplete	Recurrence	P value
Gender				
male	32	14	5	ns
female	19	11	4	(0.85)
Age				
<27 yo	27	17	6	ns
>=27 yo	24	8	2	(0.30)
Pathology				
Fibrous dysplasia	30	14	4	ns
SBC	21	11	4	(0.89)
Location				
proximal humerus	5	3	2	
proximal femur	15	5	1	ns
proximal fibia	5	2	0	(0.67)
Tumor volume				
<60 ml	44	17	7	ns
>=60 ml	7	8	1	(0.14)
Tumor length				
<6 cm	31	6	2	0.005
>=6 cm	20	19	6	
Graft				
bone substitute	27	12	3	ns
allograft	24	13	5	(0.70)
Degree of graft filling				
excellent/good	26	11	5	ns
acceptable/poor	25	14	3	(0.67)

ns: not significant; SBC: simple bone cyst; yo: years old.

Table 2. Factors and timing of healing

	Months	P value
Gender		
male	5.4	ns
female	5.7	(0.36)
Age		
<27 yo	5.5	ns
>=27 yo	5.5	(0.91)
Pathology		
Fibrous dysplasia	5.3	ns
SBC	5.8	(0.24)
Location		
proximal humerus	5.7	
proximal femur	5.4	ns
proximal fibia	5.5	(0.63)
Tumor volume		
<60 ml	5.4	ns
>=60 ml	5.8	(0.45)
Tumor length		
<6 cm	5.3	ns
>=6 cm	5.7	(0.26)
Graft		
bone substitute	5.1	0.033
allograft	5.9	
Degree of graft filling		
excellent/good	5.0	0.012
acceptable/poor	6.0	

ns: not significant; SBC: simple bone cyst; yo: years old.

No post-operative infection occurred but there was 1 incidence of post-operative re-fracture.

Conclusions

The curettage of low-invasive benign bone tumors and re-infilling of the bone with graft is a reliable procedure to mitigate the potential complication of pathological fractures and to restore the bone strength. The healing process was not influenced either by the material of the bone graft or by the degree of infilling, but was affected by the length of the tumor. On the other hand, the use of bone substitute and a tighter infilling of the defect stimulated a more rapid healing.

Complete healing rate p=0.005



Healing time (average, months) p=0.033



Healing time (average, months) p=0.012

