

# 가

가

---

: (cover  
 age), (knee extensor apparatus),  
 가 , 가  
 : 1992 4 1998 10  
 11 가 6 , 가 5  
 , 15 65 23.7 1 4  
 6 , 2 5 가 1993 (International  
 Symposium On Limb Salvage; ISOLS)  
 (functional activity), (emotional acceptance), (use  
 of external support), (walking ability), (gait) 가  
 가 0 5 1,  
 2, 3, 4 (%)  
 : 가 86.7% 53.3% 68.3%  
 , 82.5%, 62.5%, 가 67.5%,  
 77.5%, 62.5%, 57.5% .  
 5 , 85 , 5 5 , 15 , 10 (extension lag)  
 . 2 1  
 1 :  
 가  
 extension lag , ,  
 가 .  
 : , , , 가

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: 93-6  
 가  
 Tel : 031) 249-7184, Fax : 031) 254-8228, E-mail : ykang@vincent.cuk.ac.kr

. 10  
 (medial head of gastrocnemius)

6  
 가

, 4 6-9  
 Rosen T-10 T-14

가 protocol  
 가 6 , 가 5 , 15  
 65 23.7 , 1  
 1.11) 4 6 2 5 .

가 1993 (International  
 Symposium On Limb Salvage; ISOLS)

(arthrodesis), (osteoarticular  
 (rotationplasty), (allograft-pros  
 allograft), - (allograft-pros  
 theses composite) (tumor pros-  
 theses) activity), (functional  
 (use of external sup-  
 port), (walking ability),  
 (gait) 가 가 .

0 5  
 coverage, (extensor  
 apparatus) 1,2,3,4  
 (%) .

가 가 .  
 (patellar tendon)

extension lag 86.7% 53.3% 68.4%  
 , 83.6%, 61.8%,  
 가 67.3%,  
 (medial gastrocne- 61.8%, 57.2%  
 mius rotation flap) (Table 1). ,

가 ,  
 .

5, 85, , 5  
 5, 15, 10,  
 2 (18.2%) .

1992 4 1998 10  
 , . 1  
 가 53.3% ,

11 . 1  
 가 stage II B , 가 56.7% .

가 1  
 Kotz endoprosthesis 가가 56.7% , 2

**Table 1.** Functional Results evaluated by ISOLS score

Patient No.	Pain	Function	Emotional acceptance	Supports ability	Walking	Gait	Total
1	3	3	3	3	2	2	16(53.3%)
2	5	4	4	5	4	4	26(86.7%)
3	4	2	3	3	3	2	17(56.7%)
4	5	3	4	4	4	3	23(76.7%)
5	3	3	3	3	3	3	15(60%)
6	3	3	3	3	3	2	17(56.7%)
7	5	3	3	5	3	3	22(73.3%)
8	5	4	4	5	3	4	25(83.3%)
9	4	3	4	4	2	3	20(66.7%)
10	4	3	3	4	3	3	20(66.7%)
11	5	3	3	4	4	3	22(73.3%)
Total	46(83.6%)	34(61.8%)	37(67.3%)	43(78.2%)	34(61.8%)	32(58.2%)	68.5%/68.4%

가 .  
 (loosening) ,  
 . 2 (dead of dis- , Mankin <sup>10)</sup>  
 ease; DOD) , 2  
 (alive with disease; AWD) , 7 , 1983 Dubousset Missenard<sup>2)</sup> Mala-  
 (continuous disease wer<sup>7)</sup>가 (medi-  
 free; CDF) . al gastrocnemius rotation flap)  
 Malawer<sup>8,9)</sup>  
 .  
 2 ,  
 가 .  
 Eckardt <sup>3)</sup>  
 (dehiscence) ,  
 가 ,  
 Malawer McHale<sup>8)</sup> 3~4  
 ,  
 가 가 가  
<sup>5,6)</sup> , 6~9 Knee-ankle-foot orthosis  
 가 . Eckardt <sup>3)</sup>  
 ,  
 가 .  
 ,  
 extension lag  
 3~4  
 . Eilber<sup>4)</sup> 가 . 4~6

90

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(hamstring) 가  
 , 6~9  
 가  
 53.3% , 68.3%  
 가 53.3% , 1  
 가 56.7% 가  
 7 10, 30, 15, 85( ,  
 sion lag  
 6  
 4 6  
 86.7%  
 2  
 1  
 1  
 6~9

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## Functional Result of Limb Salvage Surgery with Tumor Prosthesis for Osteosarcoma of Proximal Tibia

Won-Jong Bahk, M.D., Jong-Min Sohn, M.D., Yang-Guk Chung, M.D., Yong-Koo Kang, M.D.

*Department of Orthopaedic Surgery, The Catholic University of Korea*

**Purpose** : Limb salvage for osteosarcoma of proximal tibia is challenging problem due to difficulties in mobilizing or retracting the main neurovascular structure, inadequate soft tissue coverage, and unsolved problem of patellar tendon reattachment to endoprosthesis. The authors analyzed the functional result of limb salvage using tumor prosthesis with medial gastrocnemius rotation plasty for osteosarcoma of the proximal tibia.

**Materials and Methods** : Eleven patients with histologically proven osteosarcoma of the proximal tibia, treated with adjuvant and neoadjuvant chemotherapy and limb salvage operation with tumor prosthesis between January 1992 and December 1998 at our Medical Center, were selected. There were 6 male and 5 female. Age ranged from 15 years to 23.7 years with an average of 23.7 years. Follow-up period ranged from 1 year to 4.5 years with an average of 2.5 years. The final functional result was evaluated using the method by ISOLS, 1993. The factors include pain, functional activities, emotional acceptance, use of external supports, walking ability and gait. Each of the factors has been scored from 0 to 5 depending on the appropriate description or data. The rating score is determined by dividing the individual factor scores into the total score and indicates percentage of normal function.

**Results** : The overall functional result ranged from 53.3% to 86.7% with an average of 68.3% of normal function. In details, the averages were 82.5% for pain, 62.5% for functional activities, 67.5% for emotional acceptance, 77.5% for use of external supports, 62.5% for walking ability, and 57.5% for gait. The average range of motion of the knee joint was 5° extension and 85° flexion. Five patients have extension lag ranged from 5° to 15° with an average of 10°. Two patients suffered postoperative infection. One was treated with antibiotics injection only, but the other needed removal of the prosthesis and knee fusion. Both of them showed unsatisfactory result.

**Conclusion** : The overall functional result after limb salvage using tumor prosthesis with medial gastrocnemius rotational flap for osteosarcoma of the proximal tibia was relatively satisfactory in case of no postoperative infection. The patients were less satisfactory in functional activities, emotional acceptance and gait than pain, use of external supports due to limitation of motion and extension lag. More aggressive postoperative physical therapy and protection with brace for 6~9 months as well as surgical technique is mandatory for more satisfactory result.

**Key Words** : Proximal tibia, Osteosarcoma, Tumor prosthesis, Medial gastrocnemius rotational flap

### Address reprint requests to

Yong-Koo Kang, M.D.

Department of Orthopaedic Surgery, St. Vincent Hospital, The Catholic University of Korea

#93-6 Ji-dong, Paldal-gu, Suwon 442-723, Korea

Tel : 82-31-249-7184, Fax : 82-31-254-8228, E-mail : ykang@vincent.cuk.ac.kr