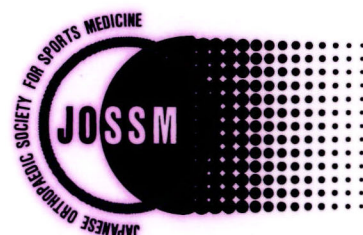


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Kavanagh BF et al：Charnley total hip arthroplasty with cement. J Bone Joint Surg, 71-A：1496-1503, 1989.

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Clinical Results and Sports Activity after Direct Repair of the Defect Using Fixation of the Spinous Processes for Lumbar Spondylolysis

腰椎分離症に対する棘突起間固定併用分離部骨移植術の 治療成績とスポーツ活動の検討

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●Key Words

Spondylolysis : Sports Activity : Direct Repair of the Defect

腰椎分離症, スポーツ活動, 分離部骨移植術

●Abstract

We have investigated the clinical result and sports activity of 22 patients under 29 years old with lumbar spondylolysis following direct repair of the defect at the pars interarticularis using fixation of the spinous processes. The aim of this surgical method is to obtain anatomical and functional repair of the lumbar spondylolytic vertebrae. The rate of bony union of the defect at the pars interarticularis was 95% at follow-up. All cases could return to sports activities, though 18% continued to have a slight low-back pain during movement. Seven of 11 cases that had belonged to athletic clubs could return to all activities at the former clubs. In 22 cases, 59% of the grafted bones in the spinous processes became absorbed. In 19 cases with 5th lumbar spondylolysis, the mean range of movement between the 1st lumbar and the sacral vertebrae decreased from 60.9° to 48.3° after surgery. However, these changes had no influence on the clinical results or sports activity.

●要旨

手術時年齢 29 歳以下の 22 例の腰椎分離症に対する棘突起間固定併用分離部骨移植術の臨床成績とスポーツ活動を検討した。この手術方法は分離腰椎の解剖学的機能的治癒を目的とする。術後、分離部の 95% に骨癒合を認めた。全例スポーツ活動に復帰したが、18% に術前よりも軽度の運動時の腰痛が残存した。クラブ活動は 11 例中 7 例が完全復帰できた。術後、22 例中 59% の棘突起間固定移植骨が吸収された。19 例の第 5 腰椎分離症症例においては第 1 腰椎と仙椎間の平均可動域は 60.9° から術後 48.3° に減少した。しかし、これらの変化による臨床成績やスポーツ活動への影響は認められなかった。

Introduction

Surgical treatment by direct repair of the defect at the pars interarticularis using fixation of the spinous processes is widely recognized for lumbar spondylolysis that shows no improvement with the conservative treatment.

The aim of surgical intervention is to obtain an anatomical and functional repair of the lumbar spondylolytic vertebrae.

Previous reports have indicated good results at follow-up, but return to sports activities has not yet been investigated^{2,3,4,5}.

In this study, we have examined patients who were under 29 years old at surgery and had been able to continue their athletic club sports after surgery.

Materials and Methods

The subjects were 15 men and 7 women with lumbar spondylolysis who were under 29 years old at surgery. Surgery was performed between 1983 and 1992 in our clinic. The mean age of the patients at surgery was 22 years old, ranging from 16 to 29 years old. The mean follow-up period was 4.4 years, ranging from 1.5 years to 9.8 years.

Concerning the level of the spondylolysis, 3 cases involved the fourth lumbar level (L4), and 19 cases involved the fifth lumbar level (L5). Three cases of spondylolysis-listhesis (slip < 10%) were included. These 3 cases were all men, one involved L4, and two involved L5. Also 6

cases of spina bifida occulta were included. Also included was 1 case of lumbar disc herniation which underwent nucleotomy.

The clinical results were assessed using score of the Japanese Orthopaedic Association (J.O.A.). The sports activities were examined retrospectively.

Radiographical investigations were performed by measuring such parameters as range of movement (ROM) between the lumbosacral vertebrae at L1-2, L2-3, L3-4, L4-5, L5-S, L1-S using the method described by Begg and Falconer with superimposition of flexion and extension X-ray films, angle of the lumbar lordosis (L1-L5), lumbo-sacral angle and lumbar index⁷.

The clinical results and sports activities were compared to investigate the influence of absorption and non-absorption of the grafted bone in the spinous processes.

CT analysis was performed, case by case, to assess the bony union.

The surgical method consisted of an iliac grafted bone interposed in the lytic portion of the pars interarticularis with posterior fixation of the adjacent spinous processes (Fig. 1)

As postoperative management, bed rest with a plaster cast bed for 6-8 weeks was required and a lumbar brace was worn for 16-20 weeks following surgery^{2,3}.

Results

The mean height and the mean body weight were 169.5 ± 5.8 cm and 63.1 ± 8.5 kg in men, and 158.6 ± 4.8 cm and 52.0 ± 7.7 kg in women. These

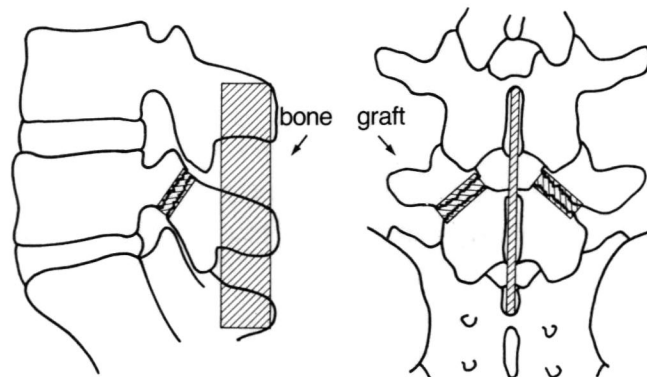


Fig. 1 Surgical method : direct repair of the defect using fixation of spinous processes

values were all within the normal ranges for their age, in Japan.

The mean period from the first medical examination to surgical treatment was 42.2 ± 37.8 months.

The mean surgical duration was 127 ± 31 minutes and the mean blood loss was 274 ± 203 ml. The only transfusions were autotransfusion.

There were two cases of surgical complications; one of thrombophlebitis in the left leg, and the other of bleeding cystitis.

Table 1 summarizes the clinical results. Before surgery, all cases had low-back pain, 2 cases had leg pain and numbness, 3 cases had leg pain and 2 cases had leg numbness. Postoperatively, 18 cases were free of low-back pain, while

Table 1. Clinical results by J.O.A. score (N=22)

	Total Score (max 15 points)	Lumber Pain (max 3 points)	ADL (max 14 points)
Pre-op.	11.9 ± 1.3	1.0 ± 0.2	11.0 ± 1.3
Follow-up	14.5 ± 0.8	2.8 ± 0.4	13.4 ± 1.1

Table 2. Return to former club activities after surgery

Athletic Clubs (N=11)		
Track and Field	3 cases	
Kendo	2 cases	
Baseball	1 case	
Basketball	1 case	
Judo	1 case	
Rugby	1 case	
Soccer	1 case	
Volleyball	1 case	
		Complete Return : 7 Cases
		Slight decrease in Activity : 2 Cases
		Change of Club : 2 Cases

Table 3. Radiographical measurements (L5 spondylolysis, N=19)

1. Mean range of movement by Begg and Falconer's method and % ratio at each level between L1-S

	L1-2	L2-3	L3-4	L4-5	L5-S	L1-S
Pre-op.	$8.1 \pm 2.9^\circ$ (13.3%)	$10.7 \pm 2.9^\circ$ (17.6%)	$9.7 \pm 2.2^\circ$ (15.9%)	$12.9 \pm 3.5^\circ$ (21.2%)	$19.2 \pm 5.5^\circ$ (31.5%)	$60.9 \pm 12.8^\circ$ (100%)
Follow-up	$9.8 \pm 5.6^\circ$ (20.3%)	$10.0 \pm 3.9^\circ$ (20.7%)	$9.3 \pm 3.1^\circ$ (19.3%)	$6.1 \pm 4.0^\circ$ (12.6%)	$13.0 \pm 4.4^\circ$ (26.9%)	$48.3 \pm 14.0^\circ$ (100%)

2. Mean lordosis angle (L1-L5)

Pre-op.	Follow-up
$33.1 \pm 11.7^\circ$	$33.2 \pm 12.2^\circ$

3. Mean lumbosacral angle

Pre-op.	Follow-up
$144.7 \pm 8.1^\circ$	$148.1 \pm 6.6^\circ$

4. Mean lumber index

$82.4 \pm 5.6\%$

Table 4. Results in the absorption group and the non-absorption group of the grafted bone of the spinous processes

1. Clinical Results by J.O.A Score (max 15 points)

	Absorption Group (N=12)	Non-Absorption Group (N=10)
Pre-Op.	11.9±1.2	11.9±1.6
Follow-up	14.5±0.9	14.5±0.7

2. Sports Activity of the Athletic Club Members after Surgery

	Absorption Group (N=6)	Non-Absorption Group (N=5)
Complete Return	4 Cases	3 Cases
Slight Decrease in Activity	1 Case	1 Case
Change in Club	1 Case	1 Case

3. Mean Range of Movement between L1-S determined by Begg and Falconer's Method in Athletic Club Members with L5 Spondylolysis

	Absorption Group (N=5)	Non-Absorption Group (N=4)
Pre-Op.	62.6±6.9°	70.8±16.6°
Follow-up	56.2±18.4°	49.8±11.6°

slight pain remained in 4 cases, slight leg pain remained in 3 cases, and leg numbness remained in 2 cases.

As for sports activities, before surgery all cases had participated in athletic or recreational sports, but had difficulties in engaging the activities due to low-back pain. Postoperatively all cases could return to sports, although 18% still had slight low-back pain during movement. At follow-up, 15 cases had completely recovered their previous level of sports activity, 5 cases had a slight disturbance, and 2 cases had a moderate disturbance.

Table 2 summarizes the return to former athletic club activities in 11 cases. A complete return to activities was achieved in 7 cases.

Concerning the radiographical examinations, all cases had bilateral lytic sites which suggested pseudoarthrosis. Bony union of the bilateral lytic sites was obtained in 20 cases. Incomplete bony union was observed in 2 cases; one involving the right site, and the other the left site.

Table 3 shows, in 19 cases with L5 spondylolysis, the mean ROM between vertebrae, the mean lordosis angle (L1-L5), the mean lumbosacral angle and the mean lumbar index.

Table 4 shows the results in the absorption group and non-absorption group of the grafted bone in the spinous processes.

Case Reports

Case 1 : A 22-year-old woman with L5 spondylolysis who played volleyball and swam as recreational sports underwent surgery in 1988. Bony union of the defect was achieved. She continues her work as a nurse, has no low-back pain, and continues to play the same sports. The grafted bone in the spinous processes was not absorbed (Fig. 2,3).

Case 2 : A 24-year-old man with L4 spondylolysis who belonged to Kendo club underwent an surgery in 1991. CT showed bony union of the defect at the pars interarticularis. He continues working as a policeman and has no low-back pain. He has returned to sports activities at his former club. The grafted bone in the spinous processes was absorbed (Fig.4).

Case 3 : A 20-year-old woman with L5 spondylolysis who belonged to track and field club underwent surgery in 1986. She obtained bony union of the defect and a complete return to activities at her former club. At follow-up she is working as a clerk and enjoys swimming and skiing as recreational sports. The grafted bone in spinous processes was absorbed (Fig. 5).

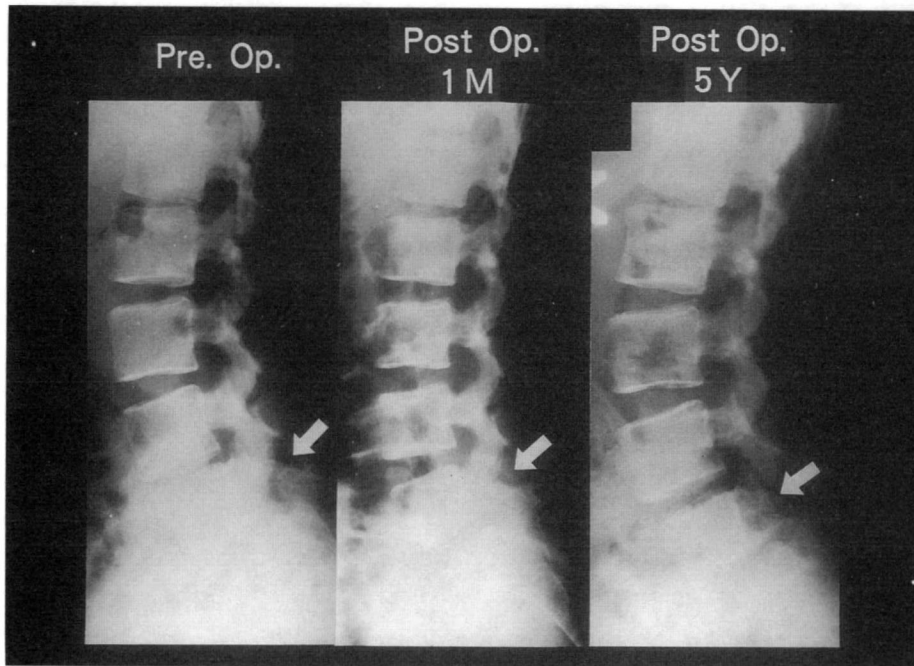


Fig.2 Case 1. A 22-year-old woman with L5 spondylolysis underwent successful repair of the defect.

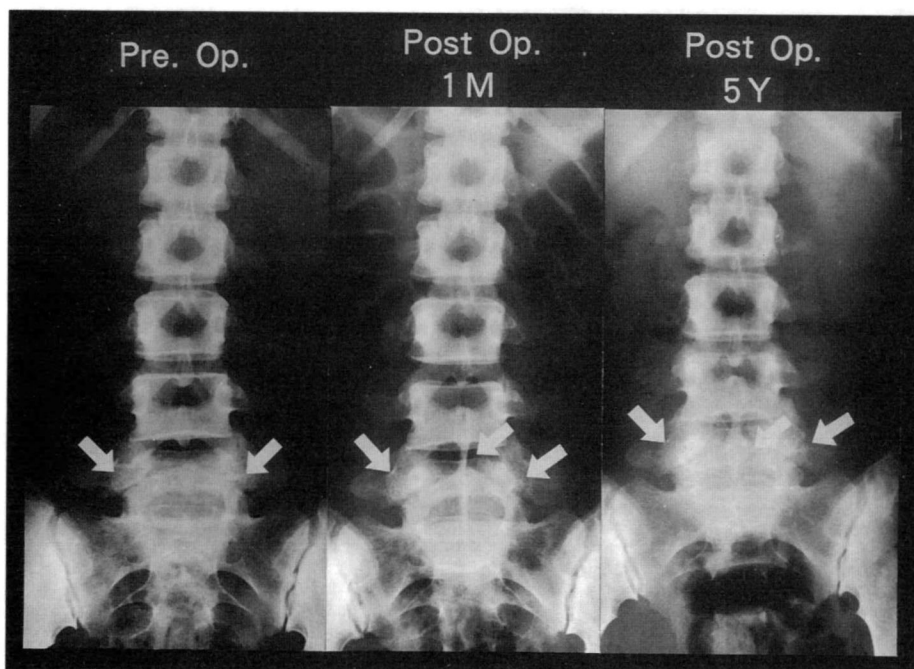


Fig.3 Case 1. Grafted bone in the spinous processes was not absorbed at follow-up.

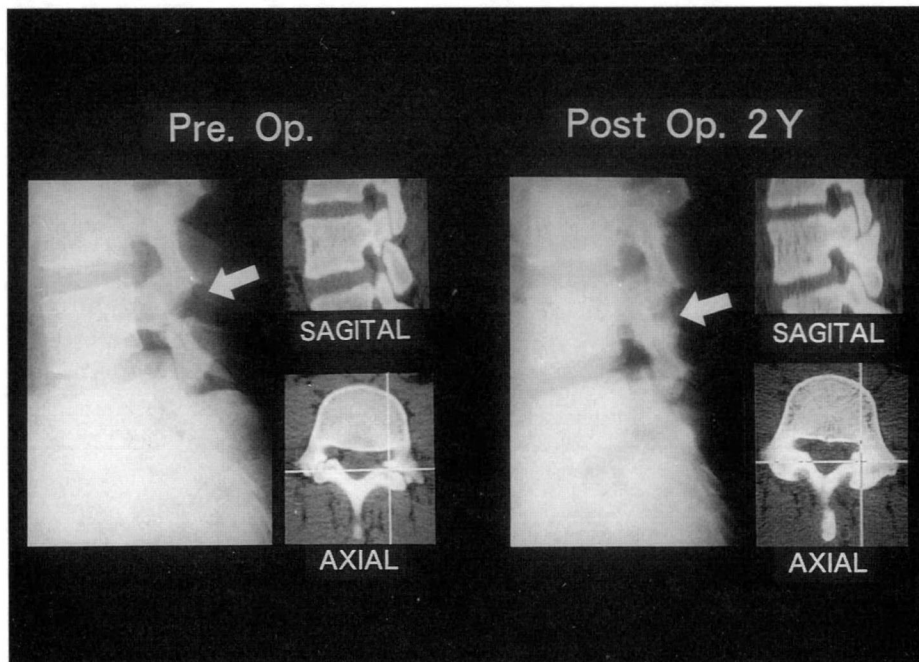


Fig.4 Case 2. A 24-year-old man with L4 spondylolysis underwent successful repair of the defect. CT showed bony fusion of the defect at the pars interarticularis.

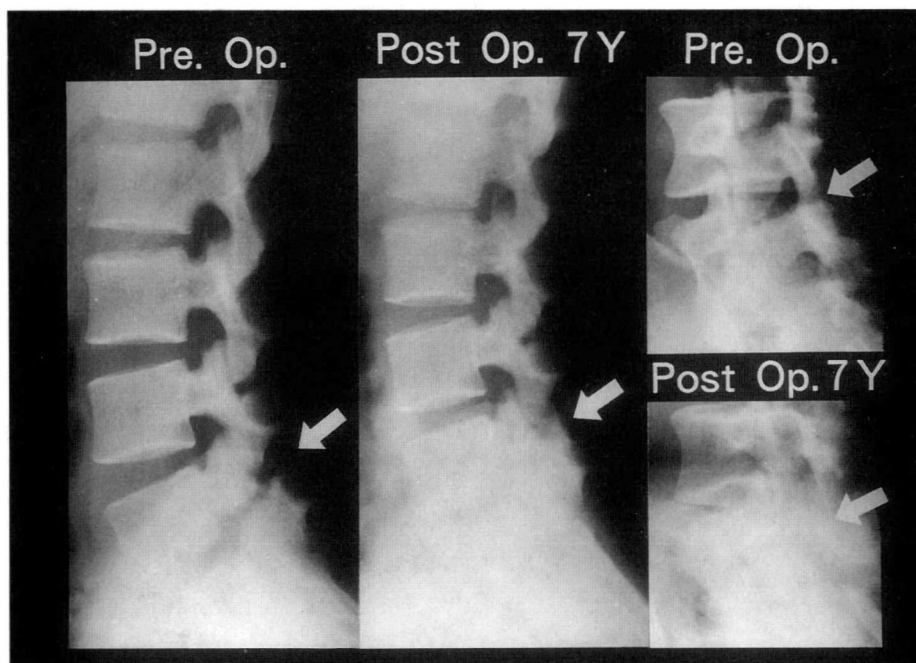


Fig.5 Case 3. A 20-year-old woman with L5 spondylolysis achieved bony fusion of the defect and complete return to track and field club activities.

Discussion

The surgical method in this study was developed by Mitsuyasu and by Kirita, to eliminate abnormal instability in a separated lamina. This surgical intervention is indicated for lumbar spondylolysis, and also for lumbar spondylolisthesis with less than 10% slip^{1,2,3,6}.

The surgery does not need instrumentation, and so the possibility of various complications is reduced, though a relatively long bed-rest is needed for the bony union of the defect at the pars interarticularis.

According to the J.O.A. score, each patient showed improvement and returned to daily life as a worker or a student.

None of the patients gave up sports, though 18% of 22 cases had slight low-back pain remaining when jumping or twisting, and 56% of 7 cases who had had leg symptoms continued to experience leg pain or leg numbness.

As for the athletic club, 64% of the patients completely returned to their former club activities. But it was difficult for students to regain a regular team position because they needed at least 6 months for retraining after surgery.

Radiographically, 2 cases had incomplete bony union, the cause of which was unclear, and these 2 continued to have low-back pain. Two of the 3 patients who had spondylolysis-listhesis had improvement in the degree of listhesis postoperatively, but the other one showed no change. In examining the radiographical parameters, we focused on the cases of L5 spondylolysis to simplify the results. The mean lumbar lordosis angle showed no change postoperatively. The mean lumbosacral angle and the mean lumbar index also showed no marked difference from other reports⁸). The ROM between L1-S decreased from 60.9° to 48.3°. The pre- to postoperative ratio of ROM between L3-4, L4-5, L5-S to ROM between L1-S were respectively 15.9% and 19.3%, 21.2% and 12.6%, 31.5% and 26.9%. The ratio of L4-5 showed a remarkable decrease postoperatively. It was supposed that the decrease in ROM between L1-S (80%) was due to stabilization of the lytic sites at L5 by the bony union. At follow-up, none of the patients complained about lumbar flexion or extension. These findings suggest that postoperative loss of intervertebral motion does not affect the sports activities.

In this study, 95% showed bony union of the

lytic portion and 59% showed absorption of the grafted bone in the spinous processes. These values accorded with those in Miyazaki's series, in which 89.4% showed bony union of the lytic portion and 53.4% showed absorption of the grafted bone in the spinous processes⁴).

The ROM at L1-S in the non-absorption group was slightly less than that in the absorption group. This might suggest a postoperative loss of the intervertebral motion at the fixation sites. However, according to the clinical results and the obtained recovery in sports activities, there was no significant difference between the two groups. The posterior fixation of the adjacent spinous processes with a grafted iliac bone is used for transient fixation to obtain bony union of the lytic portion and is not intended to affect the clinical result and sports activity.

Summary

Direct repair using fixation of the spinous processes was effective for cases of lumbar spondylolysis that had not shown improvement with conservative treatment. Neither a postoperative decrease in the intervertebral movement nor the existence of grafted bone in the spinous processes influenced the clinical result and sports activity.

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Shoulder Dislocation with a Glenoid Rim Fracture by Sports Activities

スポーツによる関節窩縁骨折を伴った肩関節脱臼

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●Key words

Shoulder dislocation : Glenoid rim fracture : Sports injury
肩関節脱臼, 関節窩縁骨折, スポーツ外傷

●Abstract

A fracture in the glenoid rim leads to instability in the shoulder joint and may be followed by recurrent dislocation if the fracture fails to unite. In most cases, the fragment is too small to be reduced and fixed surgically. We report ten cases involving a shoulder dislocation after glenoid rim fracture that occurred during sports activities which successfully operated on. Eight of the ten cases had a history of recurrent dislocations more than five times pre-operatively. In the operation, the fragment was removed and the coracoid process was transplanted with the conjoint tendon at the defect of the glenoid to repair the fracture. This procedure was done in each of the ten cases, and nine of them have been followed-up for more than one year. At follow-up, their shoulder score (JOA : Takagishi) ranged from 65 to 98 (mean : 87.8). All cases have returned to their previous sports level with no recurrence. We conclude that surgical treatment for this disorder can be successful to prevent recurrent dislocation in athletes, if the conservative treatment fails.

●要旨

関節窩縁骨折が起きると、肩関節は不安定性が増し、もし骨折が癒合しなかった場合には、脱臼を反復することがある。多くの症例では骨片は小さく、整復固定が困難である。スポーツにて受傷した関節窩縁骨折を伴った肩関節脱臼 10 例 10 関節の術後成績を調査した。この内、8 例は術前に 5 回以上の脱臼歴があった。全例で骨片を取り除き、共同筋腱のついたままの烏口突起を関節窩欠損部の修復のために移行した。10 例中 9 例において術後 1 年以上の追跡調査がなされた。これら 9 例を日整会肩関節評価表高岸試案にて評価すると、65-98 (平均 87.8) 点であった。

術後脱臼の再発は見られず、以前のスポーツレベルへの復帰をなし得た。関節窩骨折は他の骨性 Bankart 病変とは区別して認識すべきであり、もしスポーツ選手の肩関節脱臼に関節窩骨折が伴っており、保存的治療が成功しなければ、早期スポーツ復帰と再脱臼防止のために手術的治療が勧められる。

Introduction

The anterior glenoid rim is important for the stability of the shoulder joint because it is the site of attachment for the labrum and the capsulo-ligamentous complex. A glenoid rim fracture associated with shoulder dislocation decreases not only the bony restraint of the glenoid but also the restraint provided by the labrum and the capsulo-ligamentous complex. Accordingly a glenoid rim fracture can lead to recurrent dislocations in the shoulder. We therefore consider that the treatment of this injury should be discussed separately from that of shoulder dislocation with no such glenoid rim fracture.

Materials and Methods

Between 1985 and 1994, we have seen ten cases presenting a shoulder dislocation with a glenoid rim fracture incurred through sports activities.

All cases were male. The dominant shoulder was involved in 7 cases. Eight of the ten presented a recurrent anterior dislocation of the shoulder. The other two cases involved the initial dislocation. All had given up their sports activities because of pain and instability in the shoulder.

Their average age at surgery was 24.2, with a range of 17 to 34 years. A glenoid rim fracture was noted pre-operatively in nine cases, and was found until the joint was opened in the other.

Eight of the ten cases recieved arthroscopy to evaluate the site and size of glenoid rim frac-

ture, instability of the joint and condition of the labrum, which was followed by open surgery according to the systematic Bristow procedure. After a deltopectoral incision, a 2 millimeter diameter drill hole was made into the center of the coracoid process which was then dissected by a bone saw. Then the subscapularis tendon and the joint capsule were incised transversely near the insertion laterally, and were divided lengthwise parallel to the fibers being together.

The fracture site was exposed and examined directly. If the fragment still existed at the fracture site but had not united, it was referred to as non-union type (type NU). On the other hand, if the fragment existed in the joint as a free body, it was referred to as free body type (type FB) (Fig. 1). Furthermore, the size of the fragment was estimated. The fragment was termed 'grade 1' if the fragment arc on the glenoid rim extended from an angle of 15 degrees or less, and was termed 'grade 2' from an angle between 15 and 30 degrees. (Fig. 2).

The preoperative condition of the affected shoulder was evaluated by Takagishi's 100-point shoulder scoring system for ability as an athlete (30), pain (20), muscle strength (10), range of motion (10), roentgenographic change (10) and satisfaction (20).⁵⁾ The average scores was 35.2, with a range from 11 to 50. There was no significant difference in scores between type NU and type FB, or between grade 1 and grade 2 fragments.

During surgery each fragment were removed because it was not sufficiently large nor sufficiently fresh to be fixed.

After dissection, the coracoid tip was passed

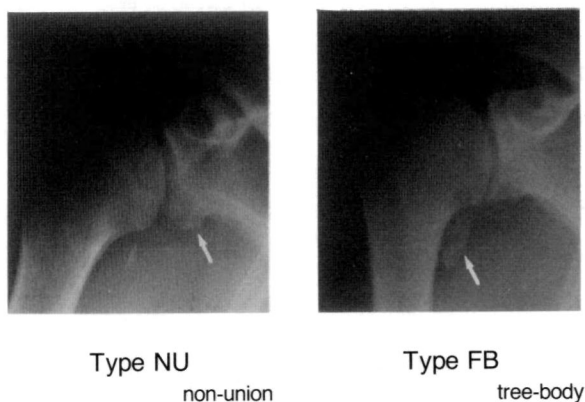


Fig. 1

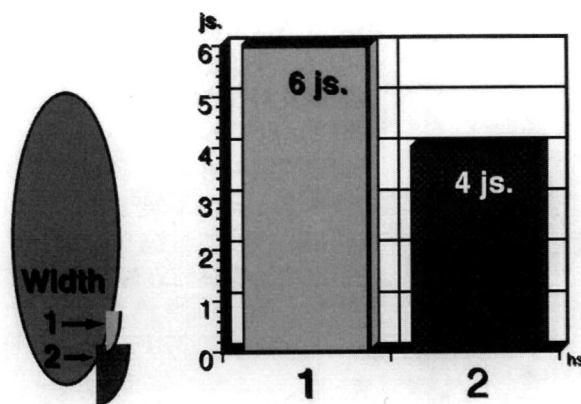


Fig. 2

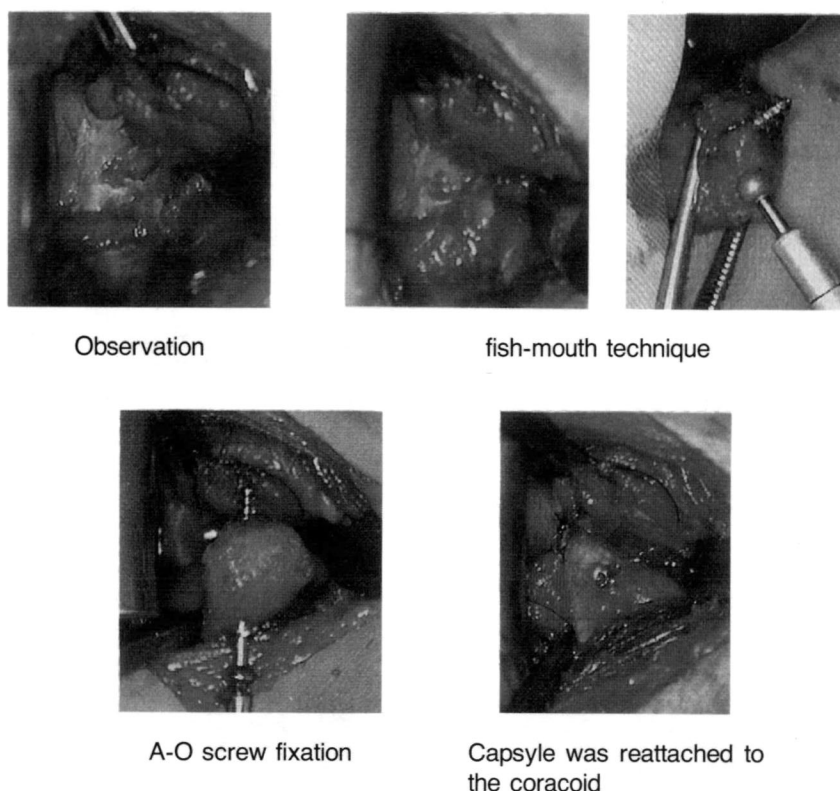


Fig. 3 a, b

through the split between the subscapularis tendon and the capsule and was transplanted to the fracture site with the attached conjoint tendon with an AO small cancellous screw. A fish-mouth technique was used to facilitate the union of the coracoid tip (Fig. 3-a). Any part of the coracoid projecting from the joint was then trimmed by a surgical burr to make the sur-

face flat and flush with the glenoid.

In one case, the glenoid defect was too large to be repaired by only the coracoid tip, an iliac bone was grafted before the coracoid transfer.

The detached labrum and capsule were then attached to the periosteum of the coracoid tip (Fig. 3-b).

The subscapularis tendon and the capsule

Case	Age at surg.	No. of dislocations	Type of Fx.(width)	Procedure	Follow-up	Preop. score	Postop. score
YS	30	20	FB(1)	SB	9Y 11M	50	86
HI	17	8	NU(1)	SB	7Y 6M	32	74
AT	23	20	FB(2)	SB+iliac b.g.	7Y 1M	15	65
TI	20	20	NU(1)	SB	7Y 0M	45	92
KY	22	50	FB(2)	SB	6Y 1M	50	90
TO	19	15	NU(1)	SB	1Y 4M	43	95
KS	22	50	FB(2)	SB	1Y 1M	11	93
KO	24	20	FB(1)	SB	4Y 9M	33	98
KT	32	1	NU(2)	SB	7Y 1M	41	97
IK	34	1	NU(1)	SB	5M	32*	

* Not evaluated

Fig. 4

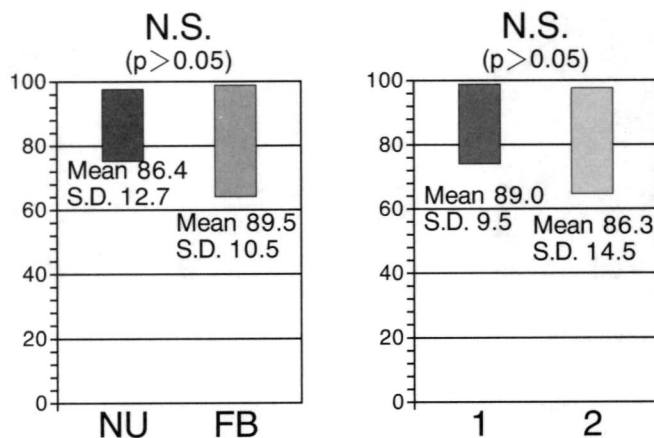


Fig. 5

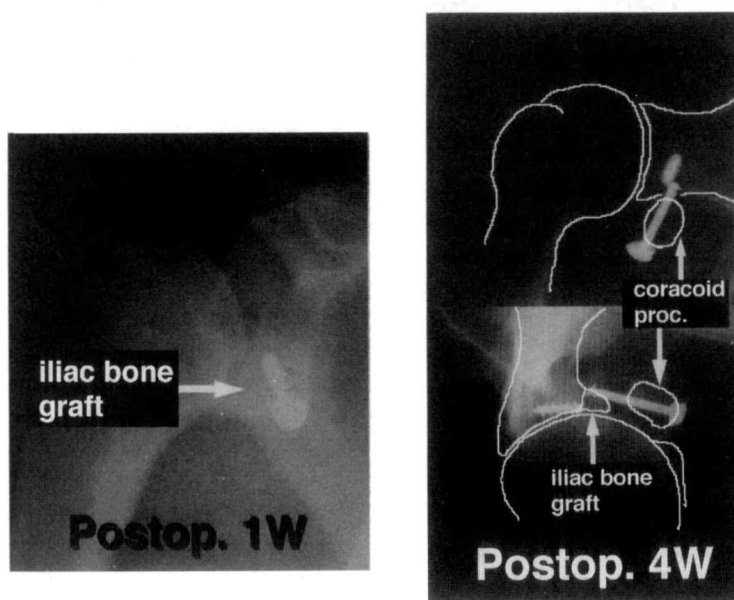


Fig. 6

were reefed together if the joint revealed any joint laxity during examination under general anesthesia.¹⁾

An arm sling and a bandage for rib fracture were applied for two weeks, then a range of motion exercises were begun.

Nine of the ten cases were followed-up for more than one year and their objective results were also examined using Takagishi's criteria.

Results

There were 5 cases of type NU and 5 cases of type FB. One type NU had not been found until the joint was opened.

The size of the glenoid defect was 'grade 1' in six and 'grade 2' in four. Nine of ten returned to their previous sports activities and the remaining case did not participate any sports in spite of successful surgery and recovery.

A breakage in the screw occurred in three cases because the coracoid tip was too long or was

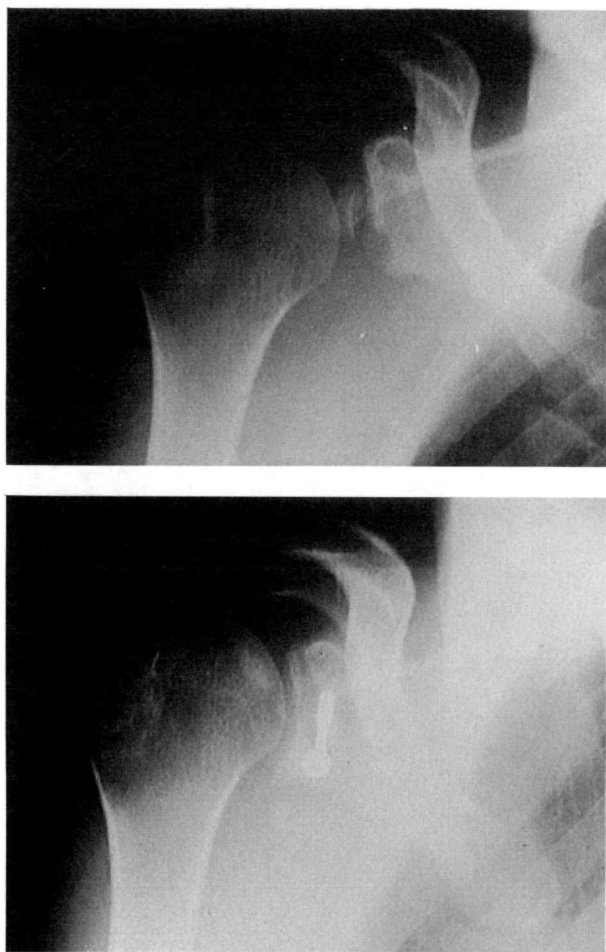


Fig. 7 a (上), b (下)

transplanted onto grafted bone from the pelvis (Fig. 6). Notwithstanding the breakage, the coracoid tip united fibrously and did not migrate in these cases. Bone union was completed well in the other seven cases (Fig. 7-a,b).

The external rotation was limited to only 15 degrees in one case that had received an iliac bone graft because it needed longer immobilization after surgery, but the remaining nine cases showed no apparent limitation in external rotation. No osteoarthritic change was revealed roentgenographically in any case.

Discussion

A glenoid rim fracture corresponds to a type 1 fracture in the Ideberg Classification²⁾, involving 7.8% of the cases of anterior recurrent dislo-

cation of the operated series in our hospital. In these recurrent dislocation cases, the fragment is not usually fresh and too small to be fixed. Therefore, we used the systematic Bristow procedure^{3),4)} for this disorder, which was developed for a recurrent dislocation with a bony Bankart lesion, and we gained satisfactory results. We consider that a glenoid fracture should be identified separately from a bony Bankart lesion despite difficulty sometimes in differentiating them. The glenoid fracture usually occurs at the time of the initial dislocation and can lead to recurrent instability. In contrast, the bony Bankart lesion is an abrasion of the anterior glenoid, resulting from recurrent instability. We made the diagnosis of a glenoid rim fracture if the joint had a glenoid defect and also the bony fragment fitted the defect.

There were two types of glenoid rim fracture (type NU and type FB). The cases of type FB, which dislocated more than 20 times preoperatively, were statistically independent of the total series ($p(x^2 > 6.67) < 0.01$) with regard to recurrent rate. These data indicate that type NU might change into type FB with recurrent dislocations. Eight cases of our ten cases were recurrent, and were initially treated conservatively but dislocations continued to occur repeatedly. Accordingly, we believe that a shoulder dislocation with a glenoid rim fracture should be treated surgically if conservative treatment fails. However, it is sometimes difficult to achieve a strong fixation because the fragment is small and abraded in most cases, and so may require a prolonged immobilization after surgery, which might lead to contracture of the joint.

The systematic Bristow procedure permits repair of a glenoid defect (as well as a Bankart lesion) that prevents any further recurrence of dislocation. The transferred coracoid tip should not be so long that it causes a breakage in the screw and non-union of the coracoid tip.

Summary

1. A glenoid rim fracture associated with shoulder dislocation in athletes should be treated surgically if conservative treatment fails.
2. The systematic Bristow procedure is recommended to repair this lesion when the fracture fragment cannot be reduced and fixed.

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Effect of Hematological Changes immediately after Marathon Competition in Middle-Aged Athletes

中高年スポーツ選手のマラソン後の血液学的変化

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●Key words

Middle age : Marathon : Blood Test
中高年, マラソン, 血液検査

●Abstract

The purpose of this study is to investigate the benefit, if any, of hematological evaluations before and after long-distance running for middle-aged athletes. The examinations were undertaken 10th World Veterans Athletic Meeting held in Miyazaki 1993. About twelve thousand athletes joined the meeting, and over five thousand participated in the marathon race. The subjects of this study were one hundred and four athletes, consisting of twelve female and ninety-two males. The results of blood tests in middle-aged athletes revealed that the levels of CK, LDH and WBC were all higher than normal prior to the marathon and were significantly increased immediately after completing the marathon. HDL-cholesterol is known to be higher than normal in many runners who have been training over a long time. Our findings suggest that CK and LDH might also be useful parameters for evaluating training effects.

●要旨

この研究は中高年スポーツ選手のマラソン後の血液検査結果から年齢およびその競技特性を知る目的で行った。対象は宮崎県で開催された世界ベテランズ陸上出場選手を対象とし、男子 92 名、女子 12 名に血液検査を行った。検査内容としてヘモグラムに加え、CK, LDH, GOT, GPT 等の検査を行った。その結果、CK, LDH は競技前から正常上限を示していたが、マラソン後には CK は著明に増加していた。また白血球数はマラソン直後に急増しており、競技における精神的、肉体的ストレスの結果と考えられた。CK, LDH はトレーニング状況のパラメーターとして利用できることが示唆された。

Introduction

The purpose of this study is to investigate the efficacy of using hematological parameters measured before and after long-distance running to evaluate training effects in middle-age athletes. The examinations were undertaken at the 10th World Veterans Athletic Meeting held in Miyazaki 1993, before and after the marathon race.

Materials and methods

The subjects were one hundred and four athletes; twelve were female and ninety-two were male (Table 1).

The youngest female was thirty-five years old and the youngest male was forty years old.

We performed blood examinations for these 104 athletes, before and after their events.

Before marathon race, forty-two males and seven females were examined by a blood test. After the marathon race, twenty-three males and two females had a blood test.

The blood test consisted of a hemogram and examination of the blood chemistry including

Table 1 Subjects

	Male	Female
n	92	12
Age	53.3yrs	43.8yrs
Height	165.3cm	156.2cm
Weight	60.0kg	49.8kg

Table 2 Blood Test

1. Hemogram

WBC, RBC, Hb, Ht, MCV, MCH, MCHC

2. Blood chemistry

Total protein, GOT, GPT, LDH, ALP, CK, UA, Cre., T-Bil, S-Iron, TIBC

creatine kinase (CK), lactate dehydrogenase, white blood cell count, and HDL-cholesterol (Table 2).

On the day of the marathon, the temperature was higher than average and the weather was changeable; beginning fair and sunny and then becoming overcast and eventually raining. Drink service for rehydration during the race was suggested as in a dehydrate.

Results

1. Creatine Kinase (CK)

Sixty-five male and nine female marathon runners showed an elevation in creatine kinase (CK, male : 220.3IU/l female : 135.3IU/l) in the blood test before the competition. After the marathon, CK was significantly higher than before marathon (Fig. 1).

2. Lactate dehydrogenase (LDH)

LDH also significantly increased after the

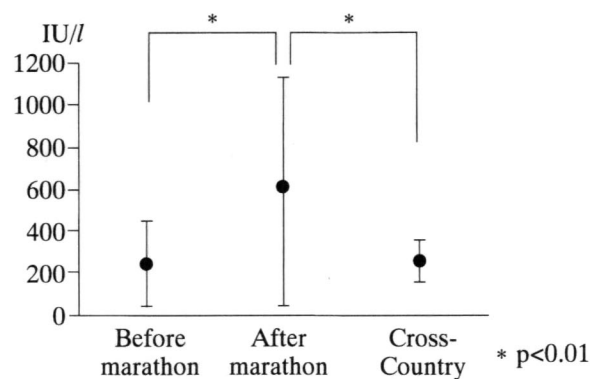


Fig.1 Creatine Kinase Levels

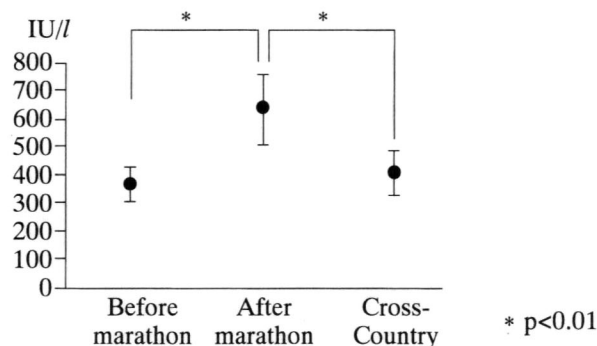


Fig. 2 LDH Levels

marathon. Twenty-three (92%) twenty-five males showed high LDH (631.9IU/l) after the competition (Fig. 2).

3. White Blood Cell

Many marathon runners showed a higher than normal white blood cell count after marathon. Seventeen (68%) of twenty-five males

had a WBC count of over 10,000/mm(Fig. 3).

4. HDL-cholesterol

The HDL-cholesterol levels prior to the race were significantly higher than normal in the long-distance runners(Fig.4).

Discussion

There are many reports on the cardiopulmonary function and on the blood chemistry in middle-distance and long-distance runners. In this study, the characteristics of long-distance runners were evaluated. Among blood components, the HDL-cholesterol level was already high, and the CK level was already markedly high. Miyabayashi reported changes in the lipid content according to training in long-distance runners, with a decreased lipid content immediately after a race. Higuchi et al. reported a higher HDL-cholesterol and a lower neutral fat level in long-distance runners than in normal controls. On the other hand, Goto found that training exercise did not always lead to an increase in the HDL-cholesterol level. In this study, the initial HDL-cholesterol levels were higher than normal, but further studies are necessary to investigate serial changes.

CK (creatine kinase) is closely involved in energy metabolism in skeletal muscles. CK was markedly increased prior to the marathon. This suggested a chronic burden on the muscle due to daily hard training. It is possible that this marked increase in CK above normal reflects a maximum state of muscle training, since the value was markedly high, and the CK isozyme is muscle-derived.

Costill et al. used the blood lactic acid concentration after exercise as a measure of fitness, while Shindo et al. used blood lactic acid (OBLA) concentration of 4mM as an indicator. It is widely accepted that a level of 4mM blood lactic acid (OBLA) concentration represents a maximum for endurance running. The level of CK, as a product of anaerobic energy metabolism, could be a useful parameter for evaluating training effects and determining a runner's physical condition. Further hematological studies are planned.

Fig. 5 shows the changes in blood chemistry of a 42-year-old male runner after the marathon. The CK level was higher after the competition. This increase in CK may be related to muscle damage. We also found that LDH increased dur-

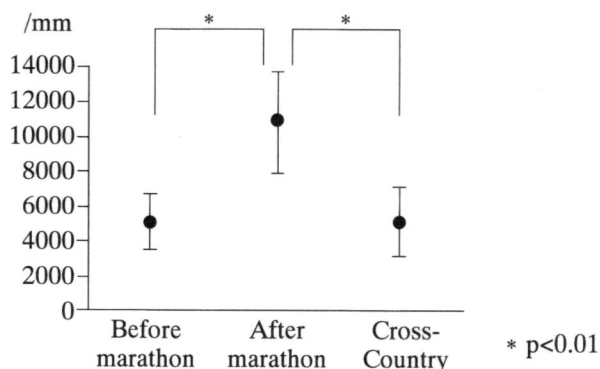


Fig. 3 White Blood Cell Counts

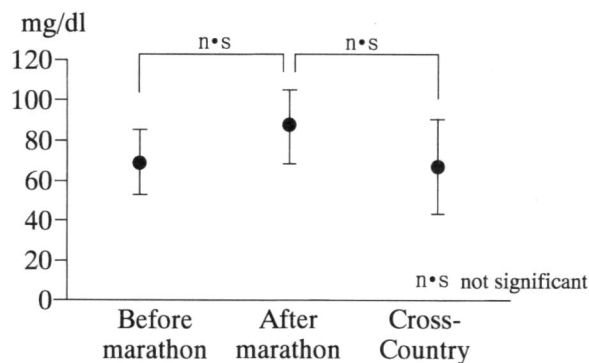


Fig. 4 HDL-cholesterol Levels

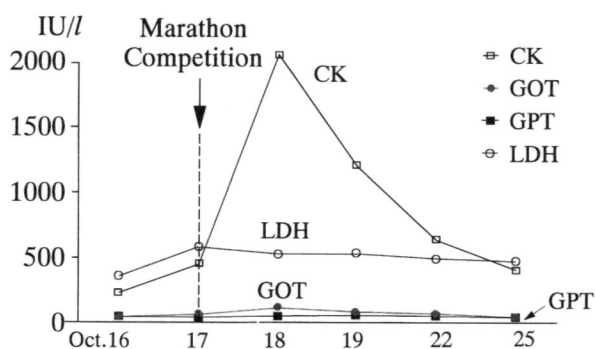


Fig. 5 Change in Blood Characteristics (42 y.o. male)

ing the actual marathon race.

The WBC count was elevated after the marathon in our examinations. The day of the marathon race was warmer than usual in this season and 'drink services' were said to be inadequate for runners leading to dehydration during the race. Also the high temperatures could have increased mental and physical stress to runners. We believe the dehydration and increased stress were responsible for the observed WBC elevation.

High HDL-cholesterol is probably due to regular training. It is recommended to evaluate the blood chemistry before and after training for athletes-especially for middle-aged athletes.

1986 (in Japanese).

Conclusion

1. Immediately after marathon, the levels of CK, LDH and WBC in middle-aged athletes were all higher than normal.
2. Also, HDL-cholesterol was high for many runners due to training over the long term.
3. It is suggested that CK and LDH may be useful parameters for evaluating training effects.

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Factors Involved in Life-Threatening Downhill Ski Injuries

重症スキー外傷の特徴

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●Key Words

Skiing injury : Abbreviated injury score : Life-threatening injury
スキー外傷, Abbreviated injury score, 重症外傷

●Abstract

Sixty cases of a life-threatening ski injury have been treated at the Critical Care and Emergency Center of Iwate Medical University between 1985 and 1994. These cases were each assessed as having an abbreviated injury score of at least 4 and were regarded as life-threatening. 81.7% were males and 18.3% were females. The site of the injury was the head in 25 patients and the neck in 12 patients, together accounting for 61.7% of the total. Collision with an obstacle was the most frequent cause among young male and the head was the most frequent site of their injury.

A fall on the slope was the most frequent cause among males at middle or advanced age (mean age 41.9 years) and the cervical spine was the most frequent site of their injury.

Those that had an interpersonal collision had an average age of 24 years and consisted of more females than males.

●要旨

1985年から1994年の10年間に岩手医大高次救急センターで経験したスキー外傷のうち abbreviated injury score が4以上の60例を重症例とし検討した。81.7%は男性で18.3%が女性であった。頭部外傷が25例、ついで頸部外傷が12例で頭頸部で61.7%をしめた。重症例の年齢分布や受傷部位は受傷機転によって異なった。障害物との衝突は若い男性に多く平均18.6歳で、頭部外傷が最も多かった。転倒例は、中高年の男性に多く平均41.9歳で頸部の外傷が多かった。対人衝突は女性の割合が大きく平均24歳であった。

Introduction

In previous reports describing severe ski injuries, definition of severe injury has been vague or subjective. Some involved an orthopedically severe injury, such as a three ligament injury of the knee, fracture of the femur or dislocation of the hip, while others involved severe loss of time from an occupation or school and were not life-threatening. Here we adopt an objective orthopedic definition severity of the ski injury of the using an abbreviated injury score AIS¹⁾, in which cases scoring at least 4 are regarded as involving life-threatening injury. The AIS now constitutes an integral part of an internationally recognized scale for grading the severity of anatomic injury following trauma.

Materials and Methods

Between 1985 and 1994, 1393 patients were admitted with a skiing injury, at the Critical Care and Emergency Center of Iwate Medical University. Those cases that had an AIS of at least 4 were regarded as life-threatening cases, and are reviewed here with respect to mode of injury, age, sex, and the site of injury.

Results

The 60 patients consisted of 49 males [81.7%] and 11 females [18.3%] (Table 1). Six [10%] were

in shock [heart rate/blood pressure > 1]. In both sexes, most patients were in the age range of 20-24 years old. The mean age of those who suffered a collision with an obstacle, a fall on the slope, and an interpersonal collision was 18.6, 41.9, and 24.0 years, respectively. The age distribution was significantly different by mode of injury ($p < 0.01$, estimated by Mann Whitney test).

The site of life-threatening ski injury was the head in 25 patients and the neck in 12 patients, accounting for 61.7% of the total. The site was the chest in 9 patients, the abdomen in 10, and the lower extremities or pelvis in 4.

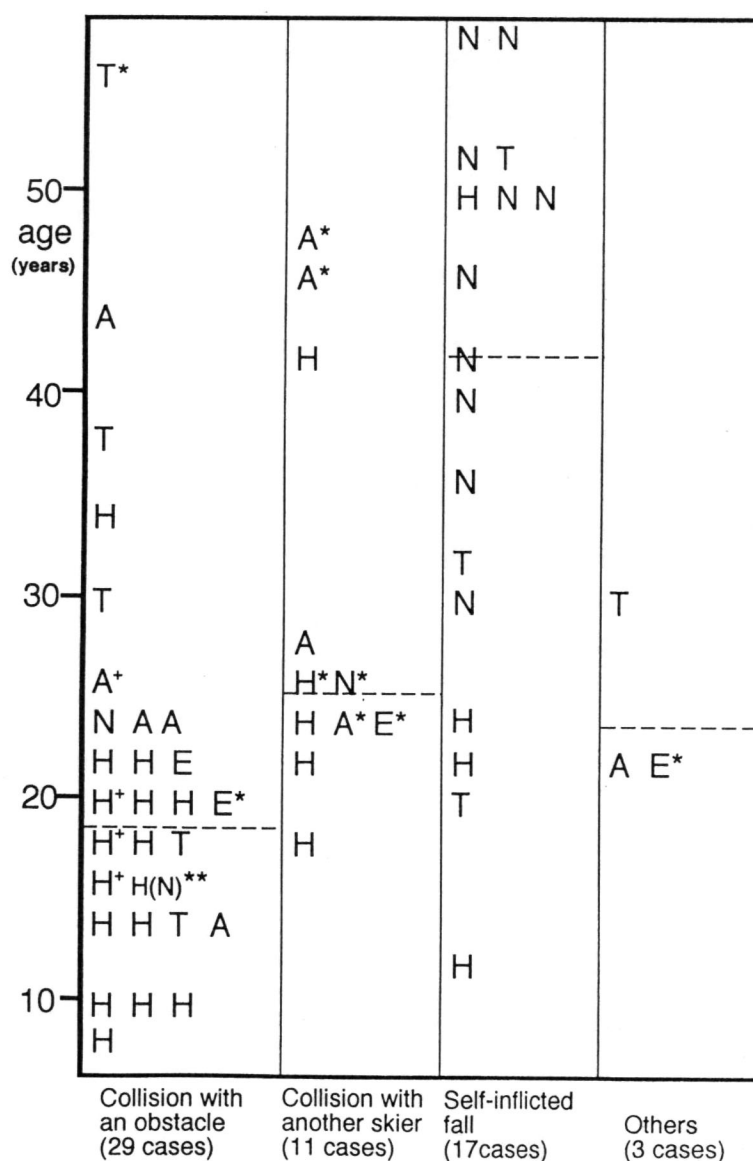
Collision with an obstacle, such as a standing tree [19 cases] or a ski-lift steel post [4 cases], occurred in 29 patients (58.0%). A fall on the slope was the cause of injury in 18 patients (30.0%). A collision with another skier was the cause in 11 (21.2%) patients.

Among the 29 injuries caused by a collision with an obstacle, the head was affected in 16 cases [55.2%], the thorax in 5 cases [17.2%], and the abdomen in 5 cases [17.2%] (Fig. 1). A collision with an obstacle resulted in death in 5 cases.

All 18 cases caused by a fall affected the upper body, 10 cases affected the neck [55.6%], 4 cases the head [22.2%], 3 cases the thorax [16.7%] and 1 case [5.5%] affected the 18 interpersonal collision was frequently complicated by a caused by the sharp edge of the ski or by the laceration ski pole, or by a collision with binding ski or personal belongings. The head was affected in 5 cases [45.5%] and the abdomen in 4 cases [36.4%]. Injuries to abdominal organs or vascular injuries in the pelvis on lower extremities led to the on-

Table 1 The site of injury according to the mode of injury

Mode of Injury	Number of Injuries						Mean age (years)
	Total	Head	Neck	Thorax	Abdomen	Extremities-Pelvis	
Total	1393	309	68	76	12	882	28.5
Life-threatening injury cases	60	25	12	9	9	4	23.5
Collision with an obstacle	29	16	1	5	5	2	18.6
Collision with another skier	11	5	1		4	1	24.0
Self-inflicted fall	17	4	10	3			41.9
Others	3			1	1	1	21.0



T : thoracic injury. A : abdominal injury. E : lower extremities-pelvic injury. * : female patients
 ** : sustaining a cervical spine injury as well as an intracranial hematoma. + : dead cases

Figure 1 : Age distribution and site of injury according to the mode of injury. a dotted line indicates median age according to the mode of injuries. H: head injury. N: neck injury.

set of shock in 4 cases. Six of the 11 female patients had an interpersonal collision.

Discussion

Most previous reports of injuries to the head, neck^{2,3)}, and thoracoabdominal regions^{4,5)} as well as the related deaths⁶⁻⁸⁾ have emphasised

that severe ski injury among young people was caused by a collision with an obstacle. Our findings, however, demonstrate that life-threatening injuries are caused not only by collision with an obstacle but also by falls and interpersonal collisions, and that the features of life-threatening injury by a fall or an interpersonal collision were different from those by collisions.

A cervical spine injury in male skiers of mid-

dle or advanced age was most frequently caused by a fall. The biomechanical natural weakening of muscle and the skeletal frame due to aging is an important element in cervical spine injuries. Oh et al. reported that 5 of 18 patients that sustained a cervical spine injury were over the age of 40 years.³⁾ Also the injury occurred due to a fall in 12 (67%) of their patients.

In Japan, 24.8—30.6% of skiing injuries are caused by a collision with another skier⁹⁾, ranking just below falls. This rate is significantly higher in Japan than in the USA¹⁰⁾, and this may be due to there being no established skiing rules in Japan with safety being the responsibility of the individual skier. To reduce the incidence of injuries resulting from collisions with other skiers, clear skiing rules and restrictions in admission to skiing grounds according to each level are needed.

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Motion Studies of the Gleno-Humeral Rhythm Using a VICON Motion Analysis System

VICON システムによる肩甲上腕リズムの動作解析

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●Key Words

Scapulo-Thoracic Joint : Gleno-Humeral Rhythm : Golf Swing
肩甲胸郭関節, 肩甲上腕リズム, ゴルフスイング

●Abstract

Our previous studies using X-ray computed tomography suggested that the scapula made co-ordinated movements with the humerus, involving a gleno-humeral rhythm in movements other than in elevation of the arm. In the present study, we employed a VICON Three-dimensional Motion Analysis System (NAC) to further investigate the motion of the scapula occurring in coordination with movements of the upper extremity. In two males with K-wires attached to their scapulae, we examined 1) the flexion and extension of the upper extremity horizontally, 2) pushing and pulling motions, and 3) golf swing motions. In each case, the scapula demonstrated a wide range of coordinated motion that indicated a gleno-humeral rhythm with each of the various movements of the upper extremity. Although the rotator cuff is important anatomically as an active muscle of the shoulder joint, we found the muscle group between the scapulo-thorax was more important as the power source, while the rotator cuff functioned as a stabilizer for the gleno-humeral joint.

●要旨

我々はこれまでX線CTを用い、上肢の挙上以外の動きにおいても肩甲上腕リズムが存在することを示唆してきた。今回 NAC 社製 VICON 動作解析システムを用い、成人男性2名の肩甲骨に K-wire を刺入して 1) 上肢の水平屈曲伸展 2) 押す・引く動作, 3) ゴルフスイングをおこなわせ、上肢の動きに伴う肩甲骨の動きを検討した。結果はいずれも大きな肩甲骨の動きが明らかとなり、あらゆる上肢の動きにともなって肩甲上腕リズムが存在することが示唆された。また比較解剖学的な見地からも考察を加え、腱板は肩甲上腕関節の主に変位ライザーとして働くべきものと考えられた。

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Introduction

In routine clinical practice, it is well known and very important that the scapula makes co-ordinated movements with the humerus during elevation of the arm, in a gleno-humeral rhythm. However, in studying the motions of the upper extremity other than the elevation of the arm, the scapula has often been neglected because the gleno-humeral joint has a much wider and freer range of motion, and there are difficulties in analysing the movements of the scapula and clavicle¹⁾²⁾³⁾. In recent years, three-dimensional analyses using a computer have been employed to study the biomechanics of the shoulder joint, but few have attached any significant importance to the scapula.

In males aged in their thirties, we measured the achievable rotations of the spine, and the adduction and adduction of the scapula using X-ray CT Scans. The average rotation angle of the spine was 24 degrees, while that of the scapula against the thorax was 53 degrees, this means that the scapula has approximately twice the range of motion of the spine⁴⁾. In a simulation of golf swings, the scapula on X-ray CT showed a range of motion of approximately 30 degrees. Moreover, the surface electromyograms of the swing-motion revealed marked electric discharge from the trapezius and rhomboideus muscles, lying between the scapulo-thorax⁵⁾. Thus, we believe that the motions of the scapula should be taken into consideration when analyzing the motions of the upper extremity, other than elevation of the arm. We have also found that the motion range of the scapula decreased greatly with ageing.

Here we have used a VICON Three-dimensional Motion Analysis System (NAC) to identify the dynamic motions of the scapula.

Subjects and Methods

Two healthy males both aged in their thirties, and both of whom each had a golf handicap of approximately 18, volunteered as the subjects, with full consent. Taking into account the possible affect on their skin, either 1.2mm or 1.5mm K-wires were inserted into the scapula under local anesthesia (Fig. 1). The VICON system was then employed to examine (1) the mo-

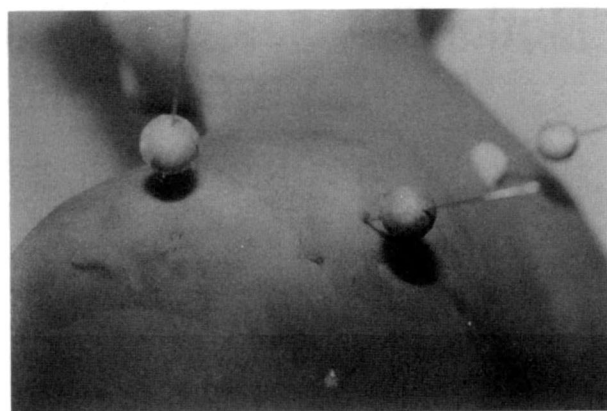


Fig. 1 K-wires were inserted into the scapula and protruded from the skin

tions of the scapula occurring with the motions of the arm in the horizontal plane; (2) the general pushing and pulling motions that often occur in daily life; and (3) the scapula motions during golf-swings with a short iron, as representative of common sporting activity.

Results

(1) The movements from maximal flexion to maximal extension of the humerus and scapula were examined in the horizontal plane, viewed here from the top (Fig. 2-a). In appearance, as the humerus moved through approximately 180 degrees, the scapula moved through approximately 50 degrees (Fig. 2-b). Thus, gleno-humeral rhythm was demonstrated in the horizontal plane during elevation of the arm.

(2) The pushing and pulling motions between the humerus and the scapula were found to be correlated (Fig. 3). The scapula and humerus clearly showed gleno-humeral rhythm, particularly in the horizontal and coronal planes.

(3) Golf-swings were also examined, viewed here from the top (Fig. 4-a,b). During the first half of a back swing, the rotation of the left scapula was more than that of the thorax. Then, during the second half, they reached the top almost as a single body (Fig. 4-c,d).

In the forward swing, the rotation of the thorax preceded the scapula. Immediately before impact, the scapula had caught up and was then ahead of the thorax. Fig. 4-d shows the correlations between the angular velocities of the tho-

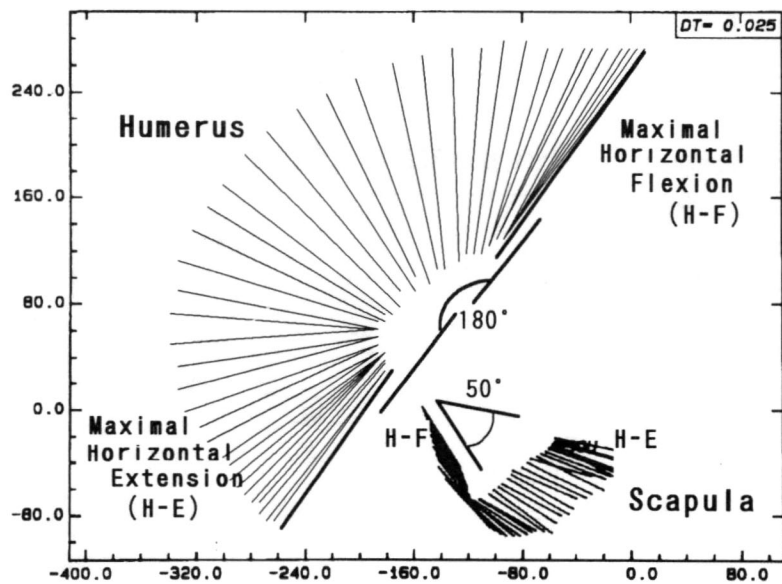


Fig. 2-a on the horizontal plane, viewed from the top (case 2)

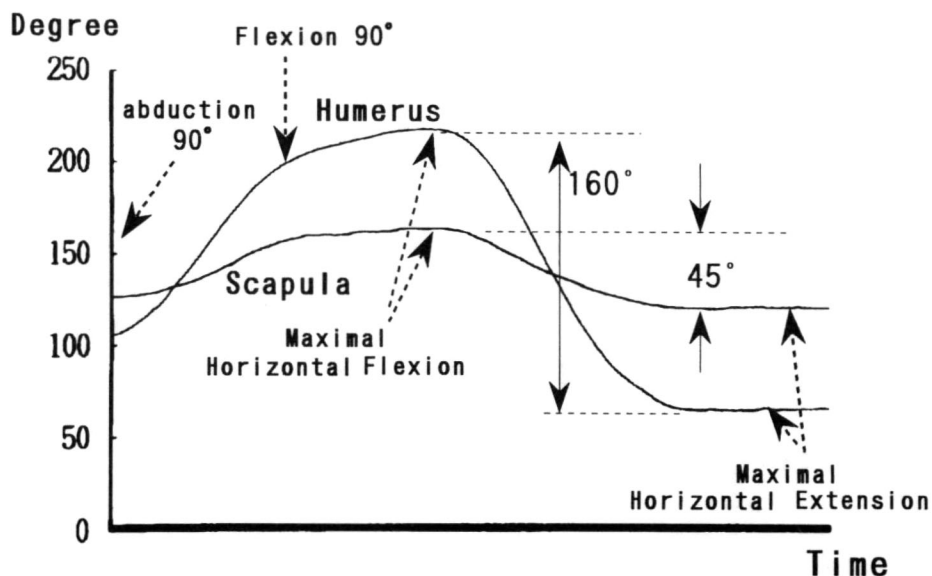


Fig. 2-b vertical axis is rotational angle, horizontal axis is time (Case 1)

Fig. 2 The movement of maximal flexion to maximal extension:

rax and the left scapula. The angular velocity was found to be highest at the left acapula during the first stage of the forward swing. The angular velocity of the thorax during the forward-swing showed three peaks.

Discussion

In the anatomical structure of the human body, the most significant difference between the upper and lower extremities is that the lower ex-

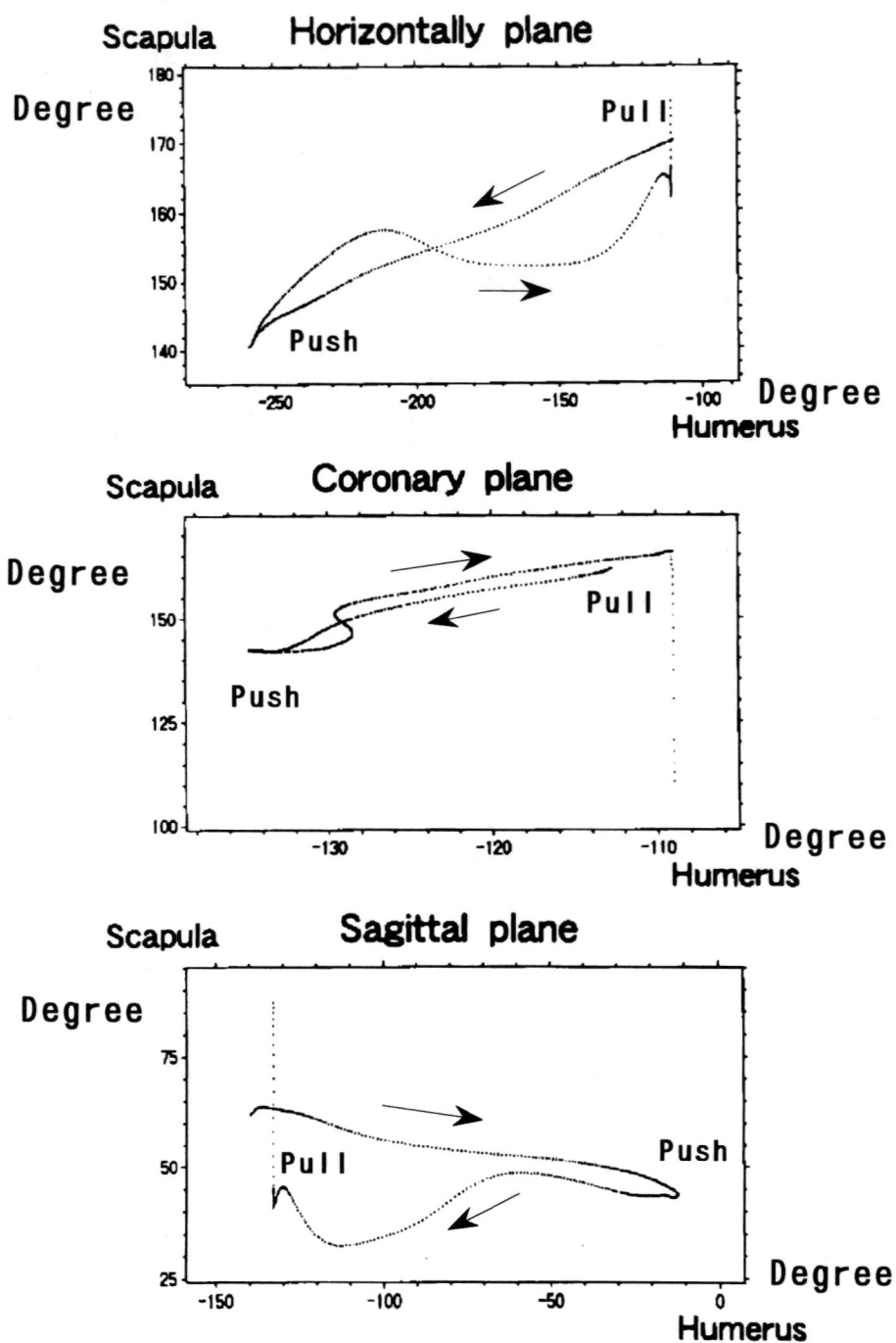


Fig. 3 The movement of push and pull motion (Case 1)

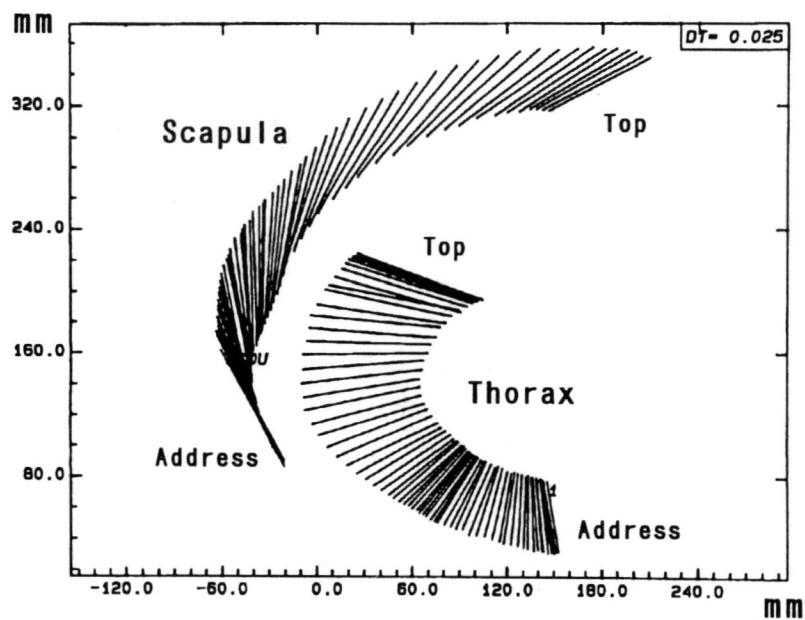


Fig. 4-a back swing on the horizontal plane, viewed from the top (Case 2)

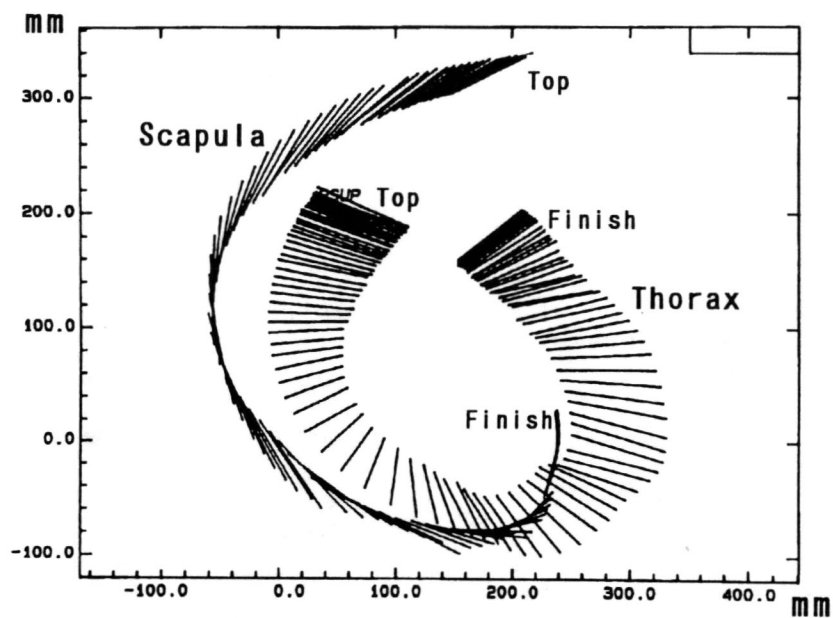


Fig. 4-b forward swing on the horizontal plane, viewed from the top (Case 2)

Fig. 4 The movement of scapula and thorax in golf swing:

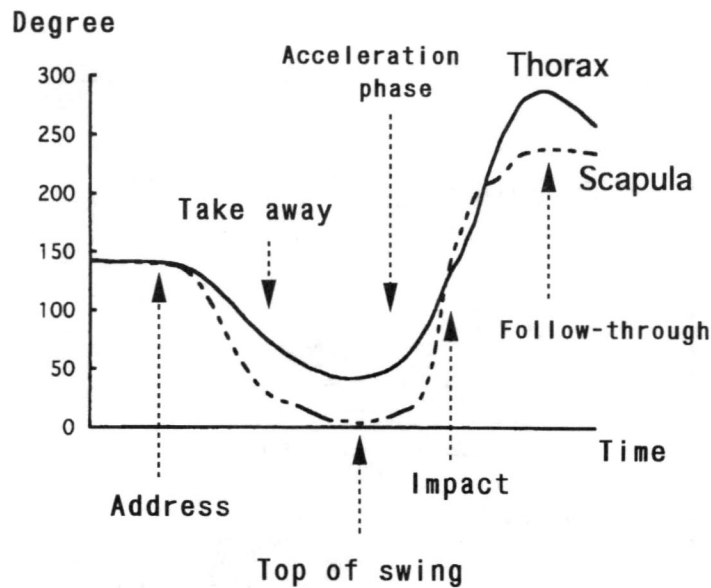


Fig. 4-c vertical axis is rotational angle, horizontal axis is time (Case 2)

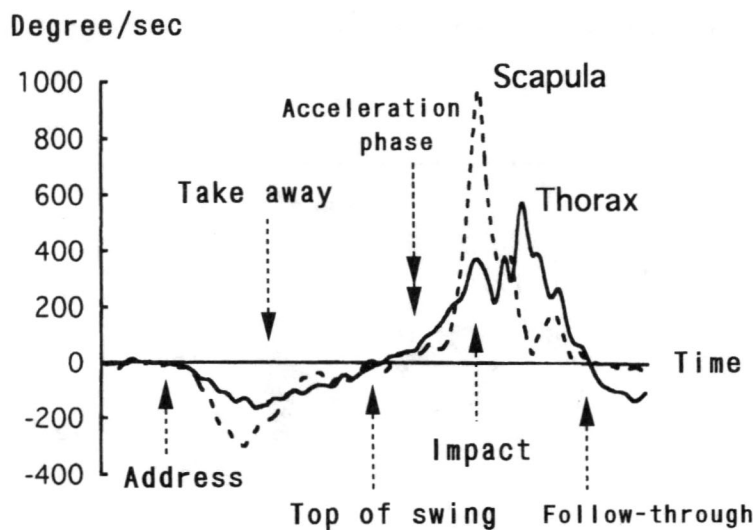


Fig. 4-d vertical axis is velocity, horizontal axis is time (Case 2)

tremity is only related to the hip joint, while the upper extremity is more complex, and is connected to the gleno-humeral, scapulo-clavicular, sterno-clavicle joints and moreover, the scapulo-thoracic joint. The upper extremity skeletally is connected to the body only through the clavicle. The extremity appears to be suspended from the cervical part by a group of muscles including the trapezius muscle. It is documented in many reports that the scapula itself has a wide range

of motion in various directions⁶⁾⁷⁾. This is fundamental knowledge in routine clinical practice. However, motions other than of elevating the arms, such as the motion of throwing a ball, have previously been analysed assuming the shoulder girdle to be the gleno-humeral joint and the scapula itself to be fixed to the thorax. Thus, movements of the scapula have been neglected.

From the results obtained in this study, using

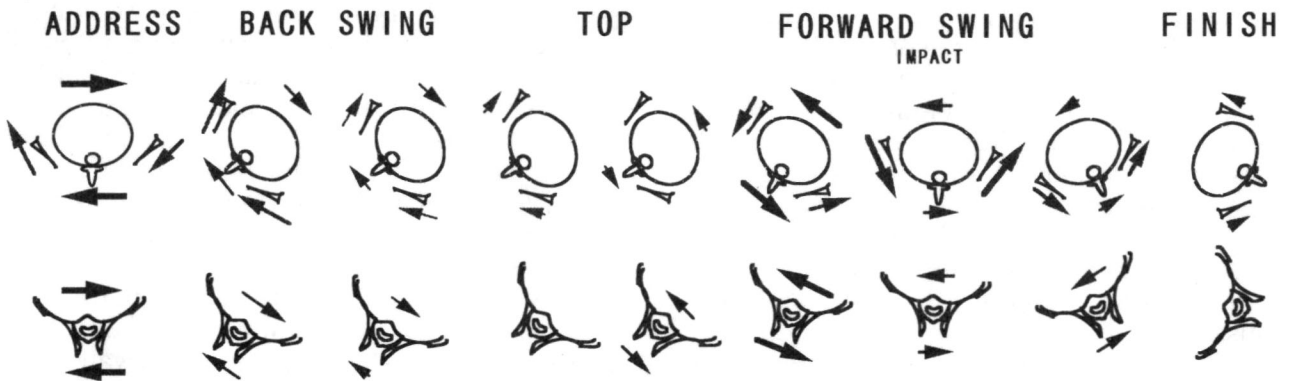


Fig. 5 Rotation of scapula, thorax and pelvis in a golf swing

the VICON Motion Analysis System, we have confirmed that the scapula shows markedly smooth coordinated movements with the humerus occurring with motions other than the elevation of the arms, and we believe that these movements of the scapula should not be neglected. Fig. 5 shows each rotation of the scapula, the thorax, the spine and the pelvis during golf-swings. At the end of the back swing almost at the top position, the motion of the spine stopped first and that of the scapula then stopped slightly later. Before and after the end of the scapula motion, the thorax and the spine started their motions for the forward swing. These time differences in motion between the scapula and both the thorax and spine maximizes the extension of muscle fibres between the scapula and the thorax (the left trapezius mus-

cle and the rhomboideus muscle for a right-handed person); thus, muscle force is fully utilized. This allows the maximum potential muscle force to be reserved at the top point of a swing for its subsequent burst or shot.

Next, the rotator cuff is discussed from the viewpoint of comparative anatomy. When attention is directed to the shape of the scapula, reptiles have no protuberance equivalent to a scapular spine, but all mammals that appeared later have a scapular spine. The scapular spine evolved so that the supraspinatus and infraspinatus muscles functioned separately and independently. Since many of the mammals are four-footed, their daily movements, such as preying on other animals and fleeing from natural enemies, are considered to be related to this evolution. Their movements suggest that the mus-

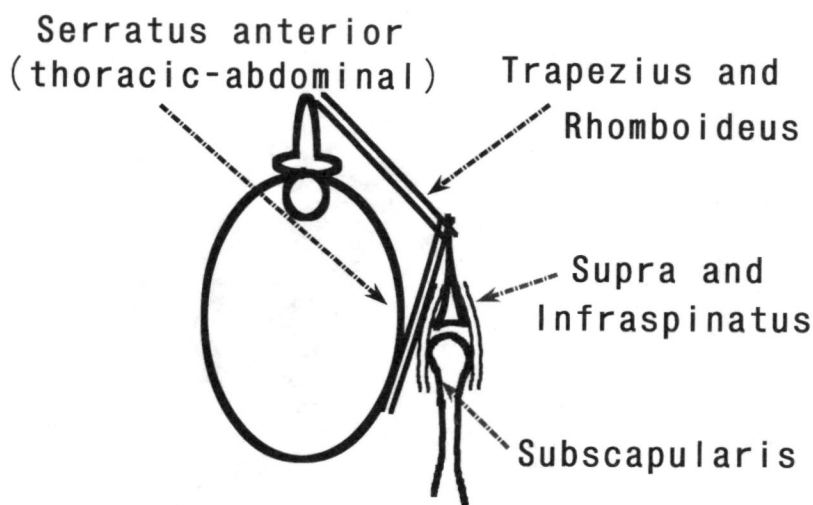


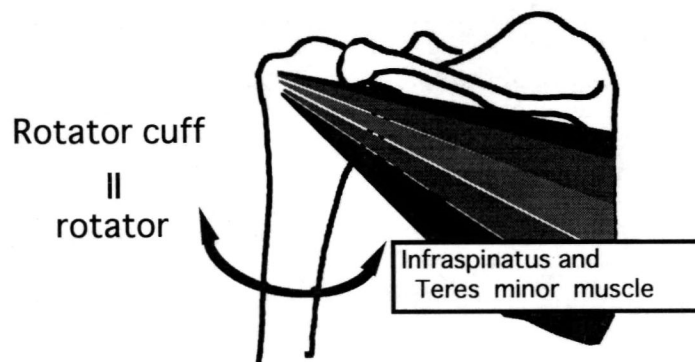
Fig. 6 The muscles that support the body are the muscles between the scapula and thorax in four-footed animals

cle tendon which constitutes the rotator cuff results from the evolution of quick and efficient direction changing while running. In addition, in many four-footed animals, the clavicle is degenerated or has disappeared. Therefore, the most important muscles that support the body are the muscles between the scapula and the thorax; the trapezius muscle and the anterior (thoracic-abdominal)-serrate muscle. The rotator cuff does not appear to be a strong support muscle (Fig. 6). In the human body, the upper extremity and the shoulder girdle are merely connected by a small clavicle when observed from the viewpoint of the skeletal structure. There are clavicles in mammals such as mice and rabbits which move to horizontally extend the forelegs. Considering these facts, the clavicle is not a bone which supports a strong movement,

but rather has the function to let more sophisticated fingers work accurately and with stability. Primarily, the gleno-humeral joint itself is only shallowly connected, and any instability is liable to cause a problem. Therefore, to enable a strong movement in the human body, a stabilizer for the gleno-humeral joint is required.

For the human rotator cuff, it is generally understood that the subscapular muscle makes internal rotations, while the infraspinatus muscle and the teres minor muscle make external rotations. This is because the human walks in an erect posture and bending and abduction of the shoulder joint at zero degrees is specified as the human basic position. Because of the orientation of the muscle fibres, the internal and external rotation forces of the rotator cuff decrease as the arms are elevated higher and approach the

1) Abduction and Flexion are 0 degrees



2) Zero position

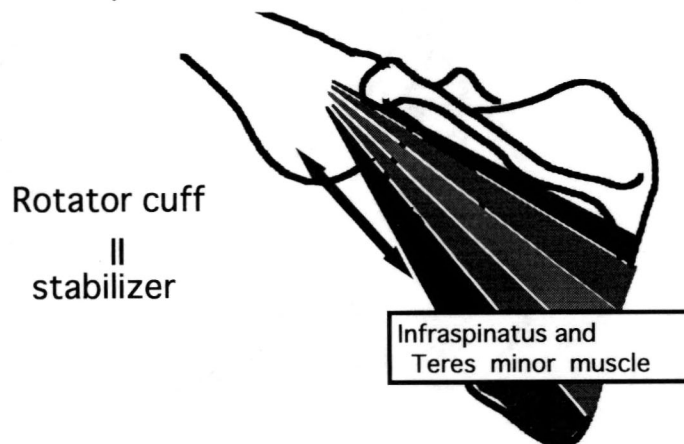


Fig. 7 The relation between rotator cuff and gleno-humeral joint

zero position (Fig. 7). This indicates that the internal and external rotation forces by the rotator cuff alone greatly depend on the elevation angle of the gleno-humeral joint. However, despite their staying at the zero position, the forces of the internal and external rotations generated by the human body has not become reduced, and we have found that the peak torque value was quite large, and was not zero as previously suggested.

In daily life, the human body exerts strong forces in movements for sports or martial arts, such as pitching, hitting, pushing, and striking. Based on their experience, baseball coaches generally instruct their players when throwing a ball, not to lower the elbow and to raise the gleno-humeral joint. However, raising the gleno-humeral joint decreases the internal and external rotation forces of the rotator cuff alone and thus it is not rational to let the rotator cuff serve the internal and external rotations during the throwing movement. This suggests that the primary function of the rotator cuff is not the daily internal and external rotations.

As the rotator cuff decreases its function as a rotator as the gleno-humeral joint approaches the zero position, we postulate that the four rotator cuffs function in a co-ordinated manner so that the humerus is stabilized with the glenoid. In movements such as throwing and making a swing, where large motions and loads

are involved, each rotator cuff does not simply function independently as a muscle for internal and external rotations, but rather its primary function is to stabilize the gleno-humeral joint for the purpose of increasing the efficiency of the muscles between the scapula and the thorax; the trapezius muscle, the rhomboideus muscle, and the anterior serratus muscle among others (Fig. 8).

Accordingly we suggest that the rotator cuff is not a rotator, but that it transmits force originating from the spine as a stabilizer for the gleno-humeral joint. If the rotator cuff were used as a rotator, then its efficiency would depend on the angle of the gleno-humeral joint. Moreover, the gleno-humeral joint would be unstable and the force originating from the body would not be fully transmitted.

Using X-ray CT, we observed that the internal and external rotations of the humerus occurred at the same time with pronation and supination of the forearm, while the elbows were in extension. This observation has been previously reported by Kapandji⁶⁾. However, this motion enables the internal and external rotations of the humerus, though passive, without using the rotator cuff which is the original internal and external rotator of the gleno-humeral joint (Fig. 9). In order to analyse accurately the motions of the shoulder joint, it is necessary to study the relative positions and motions of the elbow joint

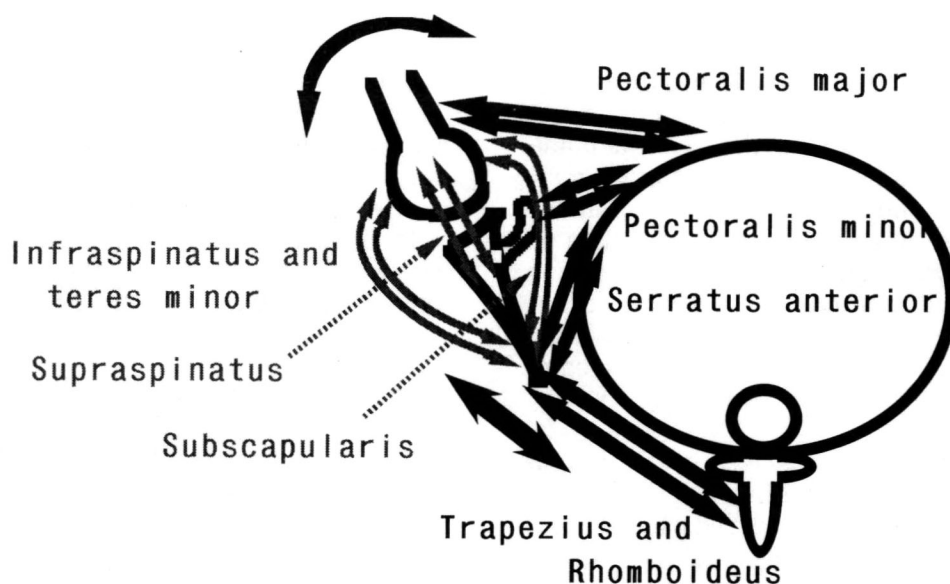


Fig. 8 Rotator cuff is not rotator but stabilizer

Pro-Supination makes rotation of
gleno-humeral joint

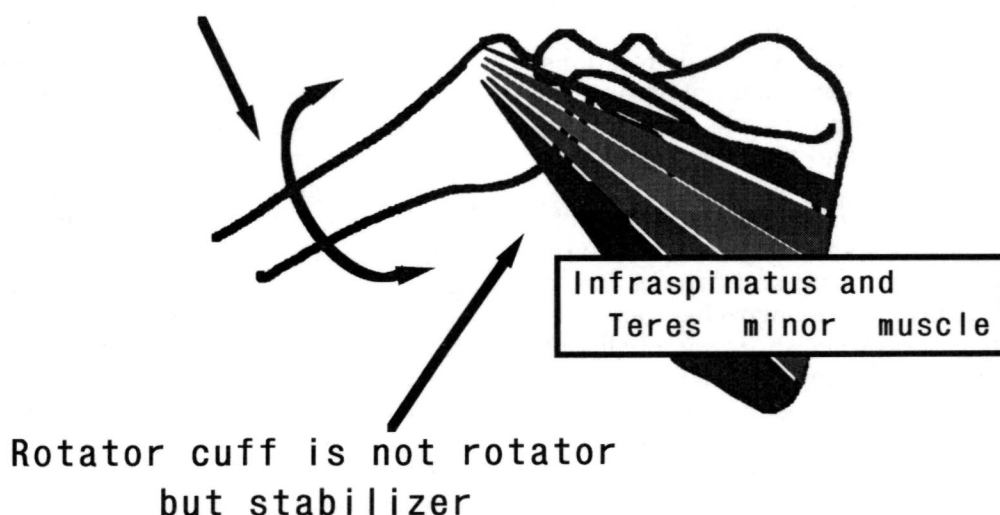


Fig. 9 Correlation between pro-supination of the forearm and rotator cuff

and of the forearm as well as to evaluate the scapula.

In golf, since a ball is placed on the ground, the player swings with the gleno-humeral joint lowered. Thus, the rotator cuff tends to function as an active muscle rather than as a stabiliser. Indeed, the motions of the gleno-humeral joint are not made by the rotator cuff even though internal and external rotations are involved, rather they occur with the pronation and supination of the forearm especially in advanced golf-players. It has been suggested that the main movements of the gleno-humeral joint are in the vertical plane. Common advice in baseball and in golf from advanced players and coaches is that you should keep the elbows at a high position, and then hit the ball downward. This provides that the internal and external rotations of the rotator cuff be avoided in the gleno-humeral joint during the early stage of the forward swing. The same mechanism is observed in tennis and in other similar sports.

In routine clinical practice, a costal fatigue fracture that occurred during a swing movement is suspected to have occurred when the rapid, and large motion of the scapula was catching up with and then getting ahead of the motion of the thorax, when excessive contraction

was applied to the anterior serratus, trapezius and rhomboideus muscles. Thus the fragile site from the point where the anterior serratus muscle of the costal bone ends to the costal tubercle, at the spinous process at the origin of the trapezius muscle, if fractured (Fig. 10).

Conclusion

The VICON system was used to investigate the motions of the scapula during various motions of the upper extremity. The roles of the rotator cuff and the muscles around the shoulder joint were examined from the viewpoints of function and comparative anatomy, in relation to their roles in baseball and in golf. Furthermore, the involvement of the motion of the scapula in the origin of costal fatigue fracture was discussed.

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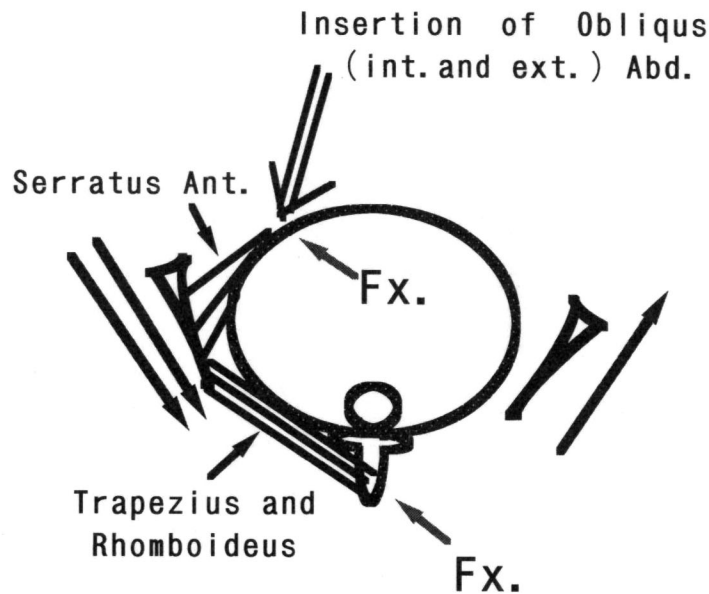


Fig. 10 Etiology of the fatigue fracture in a golf swing

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Snowboarding Injuries

スノーボード外傷

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●Key words

Snowboarding injuries : Epidemiology : Sports injuries

スノーボード外傷, 疫学, スポーツ外傷

●Abstract

We report a total of 323 cases of a snowboarding injuries that occurred during the past six winters, and were treated at the Critical Care and Emergency Center Iwate Medical University or at one or other of two Ski Resort clinics. The number of patients approximately doubled each year. 134 of the injuries involved the upper extremities, 109 involved the lower extremities 48 involved the head or neck, and 32 involved the trunk. The incidence of an injury to the lower half of the body was significantly more frequent on the left than on the right side (74 vs 35 cases, $p<0.01$). In the lower extremities, the most frequent type of injury was a sprain, occurring in 66 cases. A fracture was the second most frequent injury to the lower extremities. The most common site of injury in the lower extremities was the ankle, occurring in 51 cases. In the upper extremities, an injury to the shoulder joint was the frequent, occurring in 45 cases, followed by an injury to the wrist joint, (occurring in 41 cases). Although snowboarding has been suggested to be similar to skiing, the characteristics of the injuries related to the two sports differ considerably.

●要旨

1988・93年度の6年間に岩手医大高次救急センター若しくは岩手県内2スキー場救護室で処置を受けた323例のスノーボード外傷について検討した。症例数は、毎年約2倍の割合で増加した。受傷部位は上肢134例、下肢109例、頭頸部48例、体幹部32例であった。下肢外傷は、左側が右側に比べ有意に多かった(74例対35例)。足関節周囲の外傷が最も多く(51例)、受傷形態は捻挫が最も多く(66例)、次いで骨折があった(28例)。上肢外傷では、肩関節周囲が最も多く(45例)、次いで手関節(41例)であった。スノーボードはスキーと同じ斜面を滑走するスポーツであるが、外傷の特徴は異なることが判明した。

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Introduction

Snowboarding was introduced in Japan in the late 1970s following innovations in skitechnology. The number of snowboarders, especially among the younger generation, has rapidly increased in Japan over the past several years, with a parallel concomitant increase in the incidence of associated injuries. Only a few snowboard injuries have been reported¹⁻⁴, and their characteristics have not been described in detail. Here report the results of our survey of 323 patients presenting a snowboard-related injury over the past 6 years.

Materials and Methods

We studied 323 patients who were treated for snowboard-related injuries treated at the Appi Ski Resort Clinic, at the Hachimantai Ski Resort Clinic or at the Critical Care and Emergency Center at Iwate Medical University during the six winter seasons 1988/89 through to 1993/94. We analyzed the following variables: year of treatment, age and sex of the patient, mode of injury, and diagnosis. Diagnosis was determined from the medical records. Whenever possible, a questionnaire was completed by the injured snowboarders during hospitalization, or by a ski patrol staff member of the ski resort, describing the patient's snowboarding skills, the estimated speed at which injury was sustained, and the prevailing conditions.

The patients were divided into the following four categories of snowboarding skill: 'beginners' with limited experience who could not easily negotiate a slope; 'novices' with 1-2 years' experience and who could negotiate a slope; 'intermediate' snowboarders with three or more years' experience and who could negotiate an intermediate or steep slope; and 'advanced' snowboarders whose skills were as good as those of snowboarders who compete professionally.

The speeds at which the injury was sustained were classified into the following three categories, as well as the 'stopped' state; 'low speed,' at which the snowboarder can immediately stop, 'safe speed', which is self-controllable; and 'reckless speed', which is uncontrollable.

The prevailing conditions were as follows: 1) The slope was classified according to gradient as

one of three types; low (0 to 9 degrees), intermediate (10 to 19 degrees), and steep (20 to 29 degrees). 2) Snow on the slope was classified into four categories; fresh snow, wet snow, sugar snow, and frozen slope (Eisbahn). 3) Condition of the slope surface was classified into four types: smooth, rough, gapped, and deep snow-covered. 4) The weather at the time of injury was classified into four categories: fair, cloudy, snowing, and rainy. 5) Visibility was described as one of three categories: good, slightly poor, and poor.

Any difference in the incidence of injuries between the left side and the right side of the body was investigated using Student's *t* test, and a probability level $p < 0.01$ was regarded as statistically significant.

Results

The present study examined a series of 323 patients, 97 of whom were treated at the clinic of Appi Ski Resort, 191 of whom were treated at the clinic of Hachimantai Ski Resort, and 68 of whom were treated at the Critical Care and Emergency Center at Iwate Medical University with and overlap of 33 who were treated at two of these. The questionnaire was completed by 278 patients (giving a return rate of 86.1%). Their ages varied from 13 to 39 years with a mean age of 22 years (Fig. 1). The number of patients approximately doubled each year. Males outnumbered females (236 to 87) overall and the male/female ratio in fiscal 1993/4 was about 3:1 (Fig. 2).

Mode of Injury

A self-inflicted fall on the slope was the most frequent cause of the injury (268 cases). A collision with another skier or snowboarder was the cause of injury in 34 patients, and a collision with a tree outside the ski course was the cause in 13 patients. Eight patients sustained injury related to fatigues. Bindings were not released when the injury occurred in any of the cases.

Snowboarding skill and speed at which injury was sustained

Of the 278 patients who completed the questionnaire, 91 were beginners, 87 were novices, 76 were intermediate and 24 were advanced snowboarders. Sixty-four sustained the injury while riding at a reckless speed, 173 while riding at a safe

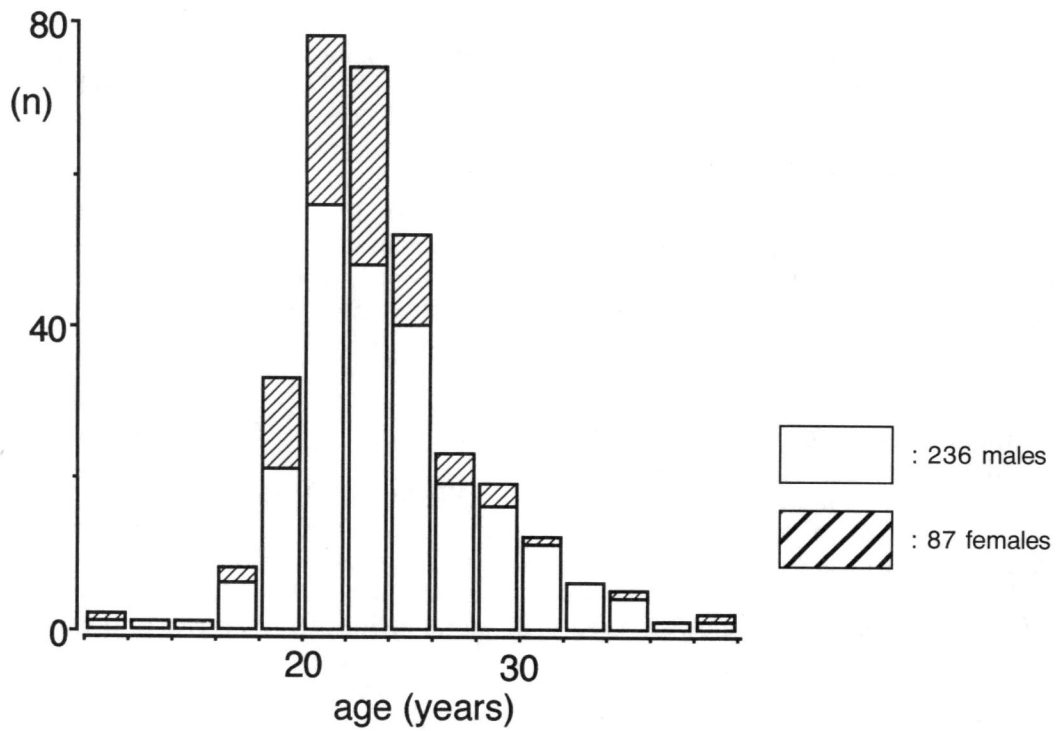


Fig. 1 Age and sex distribution of snowboarding injuries in 323 cases

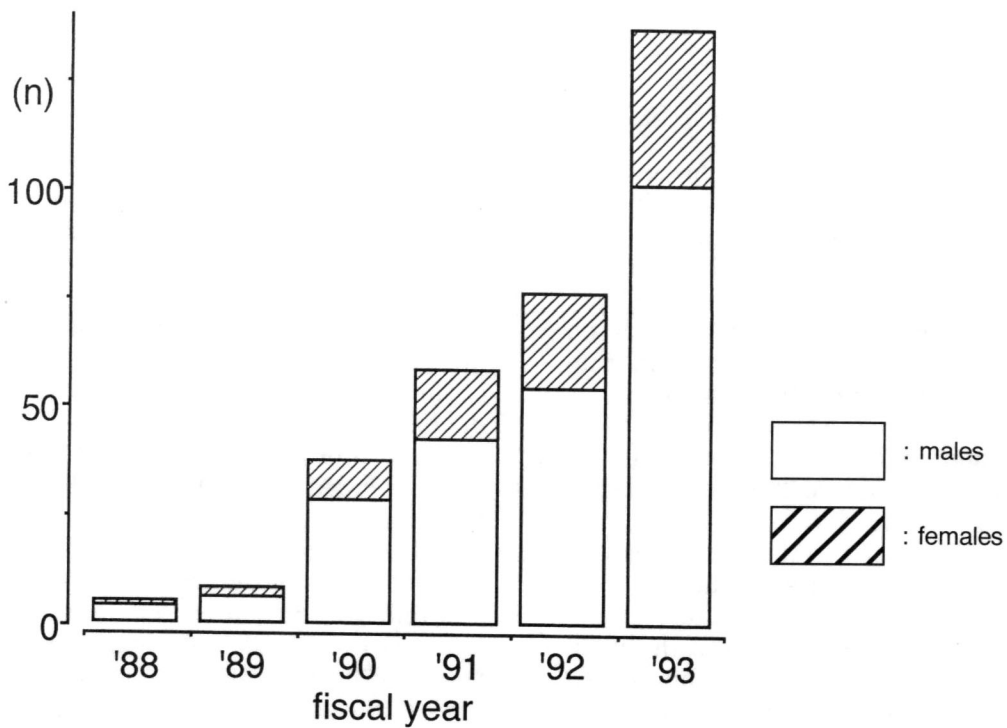


Fig. 2 Incidence of snowboarding injuries between 1988/9 and 1993/4. The number of patients approximately doubled annually. The male/female ratio in fiscal 1991/2 was about 3:1

speed, and 34 while riding at a low speed. Seven patients sustained injuries while in the "stopped" state.

Conditions at the Time of Injury

The injury occurred most frequently on an intermediate slope (170 cases), while an injury on a low slope occurred in 98 patients. Ten patients sustained the injury on a steep slope.

More injuries were sustained in fresh snow than in any other type of snow (111 cases). Sixty-nine patients sustained the injury in frozen snow, 67 in wet snow, and 31 in sugar snow.

Regarding the surface condition of the slope, the injury was sustained most frequently (185 cases) on a smooth surface. Fifty patients sustained the injury on a rough surface, 40 on an irregular surface, and 3 on a deep snow-covered surface.

One hundred and fifty injuries occurred when the weather was fair, 65 occurred when it was snowing; 61 injuries occurred during cloudy weather, and 2 injuries were sustained during rainy weather.

Visibility was good in 215 cases, slightly poor in 52 cases and poor in 11 cases.

Site and Type of Injury

Snowboarding injuries involved the arms in 134 (41.5%) of 323 cases, the lower extremities in 109 (33.7%), the head and low neck in 48 (14.9%), and the trunk in 32 (9.9%) (Table 1). The incidence of an injury to the lower half of the body was significantly higher on the left side than on the right side (74 vs. 35 cases : $p < 0.01$). An injury to the ankle joint was most frequent (51 cases), followed by an injury to the knee joint (32 cases). A sprain was the most frequent type of injury (66 cases), followed by a fracture (28 cases) and then a contusion (12 cases).

There was no difference in the incidence of an arm injury between the left side and the right side. An injury around the shoulder, acromioclavicular joints, or clavicle was the most common among injuries to the upper extremities (45 cases), followed by an injury to the wrist joint (41 cases), and then the elbow joint (20 cases). A fracture was the predominant type of injury to the upper extremities, occurring in 61

patients, 29 of whom had a fracture in the wrist joint. A dislocation occurred in 34, and a contusion in 14. The head and neck injuries consisted of 32 lacerations, 13 contusions, 2 sprains and 1 fracture.

An injury to the trunk or central body occurred in 32 cases, 22 on the ventral side and 10 on the dorsal side. Twenty of these injuries were contusions, 7 were rib fractures, 4 were compression fractures in the first lumbar vertebra, and 1 was a laceration.

Discussion

We found a higher incidence of injuries to the upper half than that to the lower half of the body, as previously reported in Japan⁴⁾. Previous reports other than in Japan had indicated an equal incidence of injuries to the upper half and the lower half of the body^{1,3)}.

We think the reasons for this discrepancy are as follows : 1) snowboarders need not go onto deep snow, as the slope is smooth and well packed at the Hachimantai Resort, as well as at other ski grounds in Japan. Whenever they fall down therefore, it is seldom that their boards are caught in the snow so their legs are seldom twisted. Movement of the legs at the time of the fall is restricted since the feet are fixed to the board with bindings, so any direct impact is transmitted to points in the upper half of body including the head, chest, shoulder, elbow, and wrist ; 2) we found that injuries often occurred falling after trying to do a "trick jump" on the slope^{4,5)}. In this situation, snowboarders fall forward or backward, and place their hands on the slope for protection ; 3) a collision was the cause of injury in 18.7% of the cases. A collision usually involves the upper half of the body, as demonstrated in previous studies of skiing injuries^{6,7)}. For preventing injury to the wrist, it is recommended that in the case of a fall then the hands are made into clenched fists. Also, wearing gloves with wrist reinforcement would help prevent injury to the wrist.

A injury to the left leg was significantly more frequent than to the right-leg. In Japan, 84.6% of snowboarders favor their left leg as the front leg.⁴⁾ Rapid deceleration experienced in an accident presumably exerts more stress on the left leg (front leg) than on the right.^{1,4)} The ankle joint was the most common site of injury, and sprains

Table 1 Snowboarding Injuries by type and part of body affected

Part of body	Total	Fracture	Sprain	Contusion	Laceration	Dislocation
Head & neck	48	1	2	13	32	
Central body	32	11		20	1	
Arm	134					
Clavicle	11	10			1	
Shoulder	45	18	1	7		10
A-C Joint	16					16
Upper arm	9	5	1	3		
Elbow	20	4	6	3		7
Forearm	9	9				
Wrist	41	29	12			
Hand	10	4	3	1	1	1
Right leg	35	*				
Thigh	2	1		1		
Knee	14		11	3		
Lower leg	7	3		1	3	
Ankle	10	6	4			
Foot	2	1	1			
Left leg	74	*				
Hip	1		1			
Thigh	4	1		3		
Knee	18		17	1		
Lower leg	10	10				
Ankle	41	6	32	2		1
Total	323	101	91	58	38	35

The difference between the incidence of injuries in the left side and the right side of the body in was estimated by Student's test. *. $p < 0.01$

were the type of injury that occurred most frequently. While both soft-type and hard-type snowboarding boots are now sold in Japan, 73.4% of snowboarders choose the former, while the latter is chiefly used by competitive snowboarders⁴⁾. The use of hard-type boots may contribute to more severe injuries to the ankle joint. Bladin et al has proposed that beginners use hybrid or soft-shell boots to reduce the severity of any ankle injury⁸⁾. Further studies are needed to determine the most appropriate footwear.

While Abu-Laban et al.²⁾ reported that snowboarders frequently sustained an injury to the spinal column due to the tendency to fall backwards, we encountered only four such injuries

(1.3%) in the present study, indicating that the spinal column was not a common site of snowboarding injuries.

Although skiing and snowboarding are similar sports, differences in the riding mode and the equipment used contribute to differences between the characteristics of the related injuries.^{1,4)}

For example, as previously mentioned, snowboarders frequently sustain injuries to the ankle joint. Knee injuries are infrequent among snowboarders but common among skiers. Lacerations scarcely occur in snowboarding accidents, which may be attributable to the fact that the bindings are not designed to loosen au-

tomatically, thus decreasing the chance of contact with the edge of the board. Injuries to the thumb, which were frequent in skiers, are unusual in snowboarding, since no poles are used.

An epidemiological comparison of ski injuries with snowboarding injuries, in Iwate Prefecture^{9,10}, revealed the following similarities in the characteristics of the injuries they occurred primarily in males aged 20 to 25 who were riding at a safe speed on smooth, median slopes covered with fresh snow, during fine weather with high visibility, and were usually caused by a fall.

Whereas novices and intermediate skiers account for three-fourths of all patients with ski injuries in Japan, unskilled beginners and novice snowboarders comprise two-thirds of all patients with snowboarding injuries.^{9,11} This probably reflects the fact that most snowboarders in Japan are lacking in experience and have yet to learn relevant techniques.

The number of snowboarders in Japan, estimated by the Japan Snowboard Association according to the number of snowboards sold, was 60,000 in fiscal 1988, 100,000 in 1989, 150,000 in 1990, 200,000 in 1991, and 300,000 in 1992, showing a five-fold increase over a five-year period. The occurrence of snowboarding injuries rose in proportion to the annual increase in the number of snowboarders. In Japan, fundamental statistics of snowboarding injuries remain inconclusive, thus making it difficult to evaluate with accuracy the epidemiology of snowboarding injury. As their incidence increases, further investigation is needed in order to provide more conclusive information.

Acknowledgments

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A High Longitudinal Arch of the Foot as a Causative Factor of Retrocalcaneal Bursitis

アキレス腱滑液包炎の病因としての高い足縦アーチ

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●Key words

Achillobursitis; Haglund deformity : Longitudinal arch of the foot
アキレス腱滑液包炎, ハグルンド変形, 足縦アーチ

●Abstract

To identify morphological causes of retrocalcaneal bursitis, a radiographic study was performed on fifty feet of twenty-eight patients with symptomatic retrocalcaneal bursitis and on sixty-three normal feet of thirty-nine subjects. All the patients had associated Haglund deformity. Accurate lateral weight-bearing radiograms were taken and examined using Yokokura's method. The mean values of the height of the points on the medial longitudinal arch and the mean value of the angle between Yokokura's base line and a tangential line to the posterior surface of the bursal projection in the retrocalcaneal bursitis group were larger than in the normal group. These findings suggested that the morphological cause of retrocalcaneal bursitis was a high longitudinal arch in the foot, which induced dorsal rotation of the calcaneus and caused the bursal projection to protrude posteriorly.

●要旨

アキレス腱滑液包炎の病因を究明するために、症状を有するアキレス腱滑液包炎 28 例 50 足と正常例 39 例 63 足の X 線像を検討した。疾患群では全例に Haglund 変形を認めた。横倉法に従い正確な荷重時足側面 X 線像を撮影した。内側縦アーチの指標の高さおよび横倉の基本線と滑液包隆起の後面の接線とのなす角は有意に疾患群で大きかった。このことからアキレス腱滑液包炎の病因は足の縦アーチの上昇であると結論できた。これにより踵骨は背側に回旋し、滑液包隆起は後方へ突出する。

Introduction

Retrocalcaneal bursitis is commonly seen in sports clinics. Although radiological studies have been performed to investigate the morphological causes of this condition, no consensus has yet been reached¹⁻⁸⁾. We have thought that an evaluation of only the shape of the calcaneus was insufficient. Therefore, using accurate weight-bearing radiograms, we have evaluated the longitudinal arch and the shape of the calcaneus from the view-point of the whole foot and obtained a new concept.

Materials and Methods

Fifty feet of twenty-eight patients (16 females, 12 males) with symptomatic retrocalcaneal bursitis and sixty-three normal feet of thirty-nine subjects (21 females, 18 males) were examined. All the patients had associated Haglund deformity⁹⁾. The ages of the subjects were all under 30 years, with an average age of 20 years for the patients and 22 years for the controls.

Radiographic Technique

Lateral weight-bearing radiograms were taken while the patient stood on one leg¹⁰⁾ (Fig. 1). The patient was permitted to use a rail on the radiographic table for support and was instructed to keep the lower limb vertical to the table. The axis of the foot was kept parallel to the cassette as suggested by Yokokura¹¹⁾. The X-ray

beam was projected from the lateral to the medial side from a distance of 100 cm. The center of the X-ray was the point of intersection between the floor line and a perpendicular line from the tip of the lateral malleolus.

Evaluation Methods

Yokokura's method¹¹⁾ for measuring the height of the medial longitudinal arch was used to evaluate the structural features of the foot. Yokokura's base line was drawn between the lowest points of the calcaneus and the medial sesamoid (Fig. 2). The midpoint of the first-cuneio-metatarsal joint, the naviculo-first-cuneiform joint and talo-navicular joint were marked L, N and C, respectively. The height of each point from the base line was obtained using a digitizer. To standardize the measurements despite differences in the size of the foot, the values were expressed as a percentage of the length from the origin to the lowest point of the medial sesamoid.

As for the angular measurements, the angle described by Fowler and Philip¹⁾ (FP angle), which is formed between the posterior surface and the plantar surface of the calcaneus, was measured (Fig.3). It is found by producing the line drawn between the most prominent point of the bursal area and the greatest posterior projection of the posterior calcaneal tuberosity, to meet a tangential line of the undersurface of the calcaneus. The angle mentioned by Steffensen and Evensen²⁾ (SE angle), which is formed between the line from the hindmost point of the posterior calcaneal tuberosity to the sinus tarsi and the line from the former point to the posterosuperior

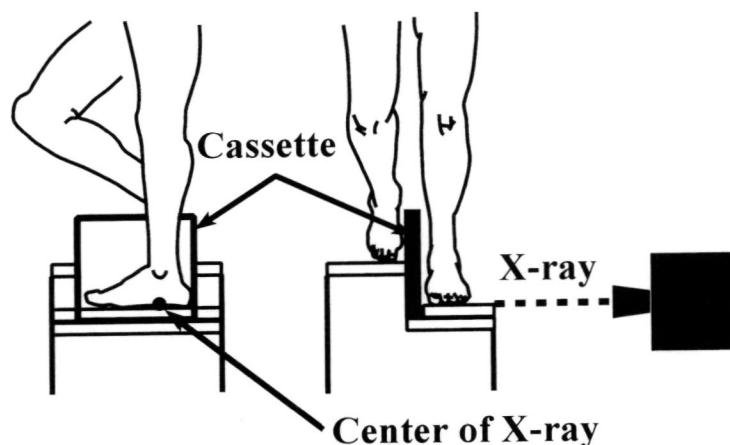


Fig. 1. Technique for a weight-bearing lateral radiogram of the foot. (Mizuno 1973)

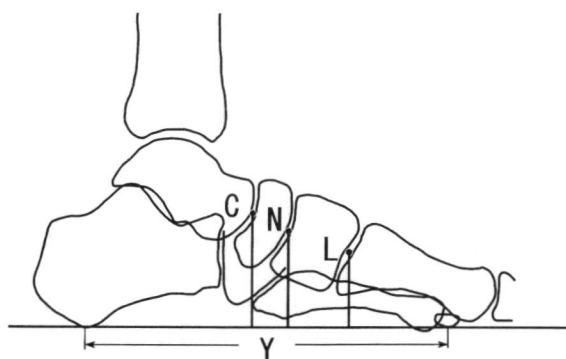


Fig. 2. Diagram showing the points described by Yokokura, which were plotted on the medial longitudinal arch of the foot. L = the midpoint of the first-cuneio-metatarsal joint, N = the midpoint of the naviculo-first-cuneiform joint, and C = the midpoint of the talo-navicular joint.

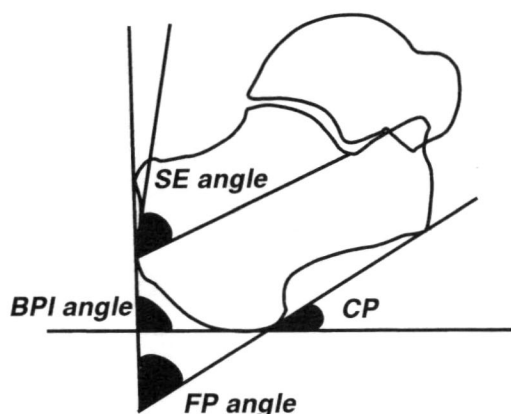


Fig. 3. Diagram showing the angles that were measured. FP angle = the angle noted by Fowler and Philip, SE angle = the angle noted by Steffensen and Evensen, BPI angle = bursal projection inclination angle, and CP = calaneal pitch.

edge of the bursal projection, was also measured. The calcaneal pitch, which is the angle between the base line and the tangential line of the undersurface of the calcaneus, and the first metatarsal inclination angle¹²⁾, which is formed by the base line and the axis of the first metatarsal, were measured.

Beside these angles, we proposed the bursal projection inclination angle (BPI angle) which is the angle between the base line and the line from

the most prominent point of the bursal area to the greatest posterior projection of the posterior calcaneal tuberosity. The latter line was the same as noted by Fowler and Philip¹⁾.

Regarding other measurements, Pavlov et al⁶⁾ described parallel pitch lines. They are constructed by dropping a perpendicular line from the posterior lip of the talar articular onto a line that joins the medial and anterior calcaneal tuberosities (PPL1). A parallel line is drawn from this posterior lip (PPL2). The portion of bone above this line consists of an abnormal bursal projection. We proposed a protrusion rate of the bursal projection, which is the height of the posterosuperior edge of the bursal projection from PPL2, expressed as a percentage of the length from the lowest point of the calcaneus to the lowest point of the medial sesamoid (Fig. 4). Positive values indicate that the posterosuperior edge is located over PPL2 and negative values indicate that it is located under PPL2.

Statistical Study

An independent two-tailed Student's *t* test was used to estimate the significance of the difference in the angles, the protrusion rate, and the height of the points, L, N, and C. A probability level of 0.05 was taken as significant.

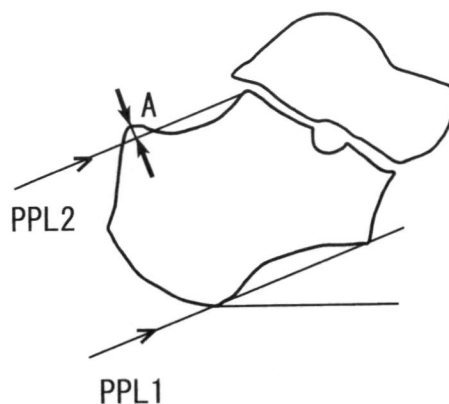


Fig. 4. Diagram showing the method for measuring a protrusion rate. PPL1 = parallel pitch line 1 and PPL2 = parallel pitch line 2. A = the height of the portion of bursal projection above PPL2. The unit is the percentage of the length from the lowest point of the calcaneus to the lowest point of the medial sesamoid.

Results

The mean values of the height of points L, N, and C in the retrocalcaneal bursitis group were significantly higher than those in the normal group (Fig. 5). These results showed that the foot with retrocalcaneal bursitis had a high longitudinal arch.

There were no significant differences in the mean values of the FP angle, the SE angle, or the protrusion rate between the two groups (Table 1). These findings indicated that the shape of the calcaneus did not differ between the retrocalcaneal bursitis group and the normal group. However, the calcaneal pitch and the first metatarsal inclination angle in the retrocalcaneal bursitis group showed significantly larger values. The mean value of the BPI angle in the retrocalcaneal bursitis group was significantly larger than that in the normal group. This finding correlated with the observation that the bursal projection of the calcaneus in the patient with retrocalcaneal bursitis protruded posteriorly

when we look at the whole foot.

Discussion

Fowler and Philip¹⁾ as well as Steffensen and Evensen²⁾ recognized the posterior protrusion of the calcaneus in retrocalcaneal bursitis using their own angles. However, some recent studies have demonstrated no differences in the FP or SE angles between a retrocalcaneal bursitis group and a normal group^{6,8)}. In this study, we could detect also no significant differences in these angles.

Contrary to this opinion, Pavlov et al.⁶⁾ proposed a model using parallel pitch lines to demonstrate the causes of retrocalcaneal bursitis. They concluded that a critical role in the pathogenesis of Haglund Syndrome was played by an inferior protrusion of the osseous plantar projection of the calcaneus which increased the calcaneal pitch and the superior protrusion of the bursal projection of the calcaneus⁷⁾. At present, this theory is accepted by many foot

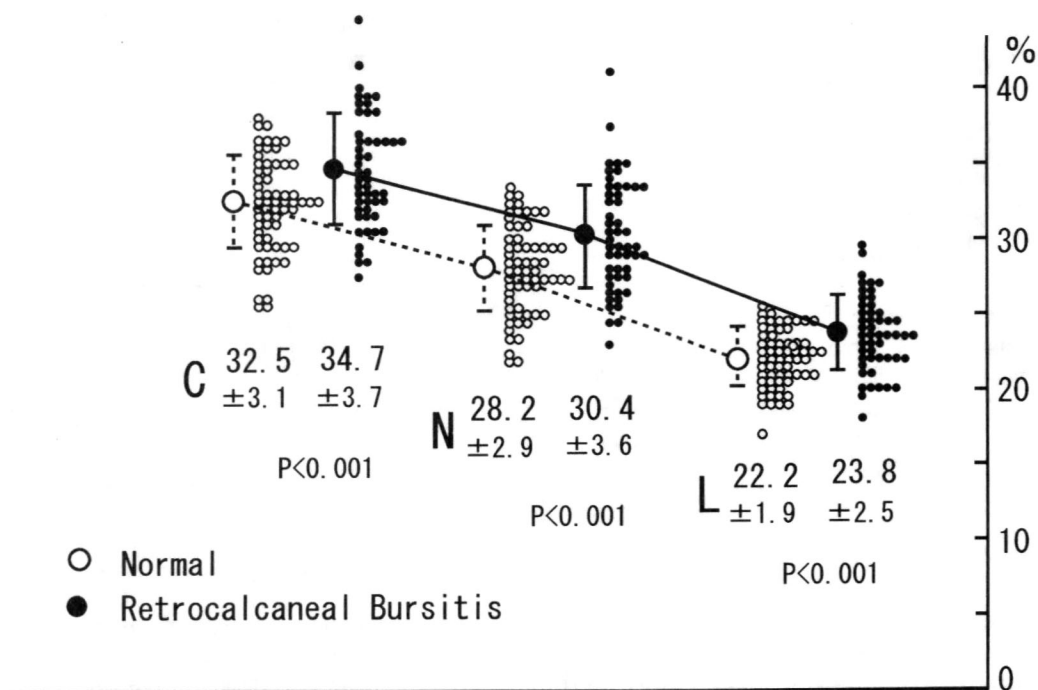


Fig. 5. Diagram comparing the values of the height of the points on the medial longitudinal arch from the base line which pass through the lowest point of the calcaneus and the lowest point of the medial sesamoid. The unit is the percentage of the length from the lowest point of the calcaneus to the lowest point of the medial sesamoid. P = probability.

Table 1 Measurements of the Feet

	Retrocalcaneal Bursitis Group		Normal Group		P Value
	Mean	SD	Mean	SD	
FP angle	65.8°	6.2°	63.9°	4.9°	ns
SE angle	55.0°	3.3°	55.8°	4.0°	ns
BPI angle	90.0°	5.1°	85.1°	5.2°	<0.001
CP	24.2°	5.2°	21.1°	4.6°	<0.01
1MT angle	25.0°	3.5°	22.4°	2.2°	<0.001
Protrusion Rate	0.6%	1.8%	0.0%	1.4%	ns

The values are given as the mean and standard deviation. FP angle = the angle noted by Fowler and Philip, SE angle = the angle noted by Steffensen and Evensen, BPI angle = bursal projection inclination angle, CP = calcaneal pitch, and 1 MT angle = first metatarsal angle. ns = not significant.

specialists¹³⁾. However, we detected no superior protrusion using parallel pitch lines in the present study.

In present study, we proposed measuring the BPI angle and found proved that the bursal projection of the calcaneus protruded posteriorly when we looked at the whole foot. We know that the BPI angle is related with the calcaneal pitch. However, it is significant that posterior protrusion of the bursal projection can be detect directly with the BPI angle. Keck and Kelly⁴⁾ described that they could not determine the FP angle accurately because consistent points of reference were difficult to locate. However, we used the same line of the posterior surface of the calcaneus for the FP angle and the BPI angle. Under these conditions, the BPI angle showed larger values in the retrocalcaneal bursitis group whereas the FP angle did not. Furthermore, our study established that the foot with retrocalcaneal bursitis had a high longitudinal arch. These findings suggested that the morphological cause of retrocalcaneal bursitis was an increase in the height of the longitudinal arch, which caused an

inclination in the calcaneus, which in turn caused a posterior protrusion in the posterosuperior prominence (Fig.6).

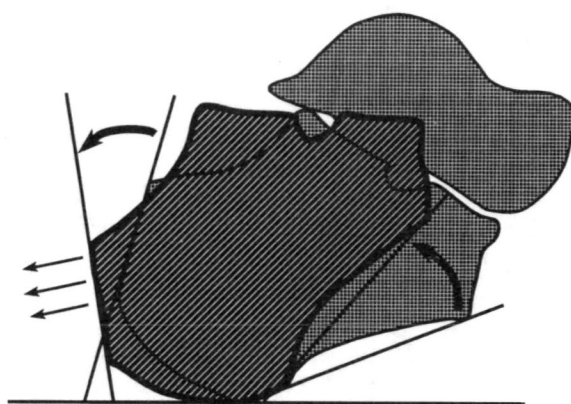


Fig. 6. Diagram showing the causative mechanism of retrocalcaneal bursitis. The high longitudinal medial arch causes the rotation of the calcaneus to the vertical position, which makes the bursal projection more prominent posteriorly.

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A Case of Bilateral Extensive Chondromalacia of the Knee Affecting Both P-F and T-F Joints

脛・大腿関節の軟骨軟化を合併した膝蓋軟骨軟化症の1例

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●Key words

Chondromalacia : Patella : Tibio-femoral joint,
軟骨軟化症, 膝蓋骨, 脛・大腿関節

●Abstract

A 37-year-old female who had been playing volleyball for the past 25 years presented severe pain in the left knee. The clinical findings at the first consultation included mild swelling and a patellar ballotment in the left knee. The McMurray test indicated pain and a click inside. ROM was normal and there was no ligamentous instability. The X-ray findings revealed the P-F joint was of Wiberg type II. On MRI, the T₁ weighted imaging indicated a lower signal intensity and an increased width in the cartilage of the medial femoral condyle. Arthroscopic findings were a crab meat appearance and chondromalacia in the cartilage of the P-F joint. Also observed were chondromalacia, defective cartilage and a large number of loose bodies in the T-F joint. Under arthroscopy, the loose bodies were extracted and the cartilage was shaved and drilled. Though the pain was slightly alleviated, the patient still feels some pain in walking.

●要旨

バレーボール選手に見られた両膝の脛大腿関節軟骨軟化症を合併した膝蓋軟骨軟化症の極めて稀な1例を経験した。

症例は37才女子, 元実業団バレーボール選手で, 現在は趣味としてスポーツを行っている。1991年頃より左膝関節痛あり, 症状は徐々に進行した。X線所見でP-F関節はWiberg II型で, 膝蓋骨の位置異常はない。MRI所見でT1強調像にて大腿骨内顆関節軟骨の信号低下と幅の増加を認めた。関節鏡所見では, P-F関節軟骨の毛羽立ちと軟化, T-F関節の大腿骨内顆部軟骨軟化と欠損, 遊離体を認めた。遊離体摘出, 軟骨のシェービング, ドリリングを行った。左側も同様の所見である。症例軽減したが, スポーツ復帰は困難である。

Introduction

Patellar chondromalacia is not included among the rare diseases causing knee joint pain in young females. Along with an increase in the number of those enthusiastic in playing sports, there is an increase in the number of sports-related knee disorders among young females. These include not only injuries to the meniscus and ligaments but also chondromalacia. However, there have been few cases reported of chondromalacia that progressed into the tibial and femoral joints^{2,3)}. Here we report a rare case of a young female volleyball player having patellar chondromalacia complicated with chondromalacia in the tibio-femoral joints of both knees.

Case Report

The patient is a 37-year-old female who has played amateur volleyball for 25 years, including 3 years on a junior high school team, 3 years on a senior high school team, and 5 years on a corporation team.

The patient sprained her left knee joint while playing volleyball on December 11th, 1991. Although the pain persisted, she did not seek medical treatment and continued practicing twice a week on her volleyball team.

By mid-February, 1992, the pain had become severe enough to keep her from playing volleyball.

The patient visited our clinic on February 28, 1992. Physical examination of the left knee joint revealed synovial thickening, joint effusion, and retropatellar pain and crepitation. The McMurray test revealed a painful click on the medial side. Range of Motion (ROM) was normal and there was no appreciable instability.

X-rays revealed Wiberg Type II patella without patello-femoral joint malposition or incongruency. Magnetic Resonance (MR) images disclosed thickening of the medial femoral condyle cartilage, which had low signal intensity on the T₁-weighted sequence. The low signal intensity suggested cartilagenous swelling and degeneration.

The patient underwent arthroscopy on April 1, 1992. No meniscus or ligamentous injuries were noted. The articular cartilage of the patello-femoral joint had degenerated to a crabmeat ap-

pearance. The same condition in a more degenerated state was noted at the medial femoral condyle in the tibio-femoral joint. Within the knee joint, there were multiple cartilagenous loose bodies which appeared to be fragments of the degenerated cartilage. A diagnosis of chondromalacia of both the patello-femoral and the tibio-femoral joints was made.

Arthroscopic removal of all the cartilagenous loose bodies, excision of the degenerated articular cartilage, and drilling of the subchondral bone were performed.

Post-operative rehabilitation included isometric strengthening of the quadriceps and hamstrings, and active ROM exercises. The rehabilitation started within a few days after the operation. The post-operative course was uneventful. There was considerable pain relief within three months, although the left knee joint pain kept her from playing volleyball.



Fig. 1a



Fig. 1b

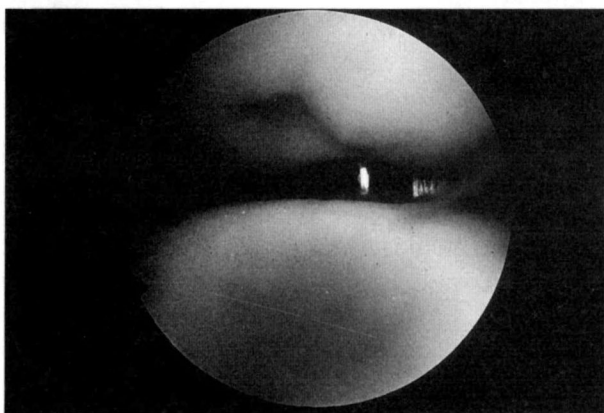


Fig. 2a : P-F joint

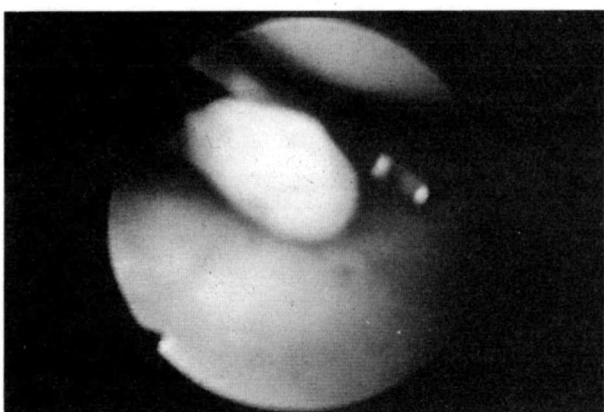


Fig. 2b : Loose bodies

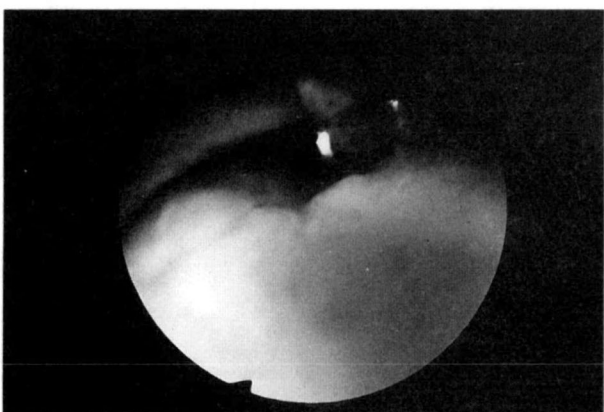


Fig. 2c : Fissure in the lateral tibial plateau cartilage

The patient presented again with right knee joint pain in March, 1993. Physical examination revealed painful crepitation at the patellofemoral joint and on the medial side of the

tibio-femoral joint. MR images disclosed abnormal signal intensity, suggesting cartilagenous degeneration at the medial femoral condyle.

Arthroscopy was performed on April 16, 1993. The articular cartilage was soft and degenerated with crabmeat appearance at the medial side of the patella, the medial femoral condyle and the lateral tibial condyle.

Arthroscopic excision of the degenerated cartilage and drilling of the subchondral bone were carried out.

Histological examination of the degenerated cartilage showed no inflammatory reaction.

Although surgery considerably alleviated pain in the right knee joint, residual symptoms kept the patient from playing volleyball.

Discussion

Instability or a morphological abnormality in the patella, an elevated patella or trauma have each been suggested as the cause for patellar chondromalacia.

However, including the cases of sports players, there seem to be a large number of patients with idiopathic patellar chondromalacia of unknown cause. In our case, the condition occurred in the left knee after she had sprained it. Since external force was not directly applied to the patella and nothing definitely abnormal was detected by X-ray on the patella, it was concluded that her condition was idiopathic.

A differential diagnosis of the condition generally includes discrimination from a meniscus or ligament injury, osteochondritis dissecans, and an osteocartilaginous fracture. Also in the present case, differentiation from OA was necessary⁴⁾. However, the patient was consequently diagnosed to have chondromalacia from the X-ray findings of no marked sclerosis in the subcartilaginous bone and no osteophyte formation. Also MRI detected swelling in the cartilage. Chondrosis and a defect in the cartilage were observed by arthroscopy while the surface layer of cartilage was comparatively maintained (so-called basal degeneration reported by Ficat, Goodfellow¹⁾).

In conclusion, it is important to pay attention to potential damage in the articular cartilage in addition to any injury to the meniscus or ligament when presented with pain in a knee related to a sports-related disorder.

Summary

- 1) We have reported a case of patellar chondromalacia complicated with chondromalacia in the tibio-femoral joints.
- 2) The patient was a 37-year-old female volleyball player. The treatment was difficult, and due to persisting pain in both knees she is still unable to play sports.

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Multiple Flexor Tendon Injury Secondary to Hamate Hook Fracture in a Golf Player: A Case Report

有鉤骨骨折により2次的に発生した屈指腱皮下断裂の1例

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●Key words

Tendon rupture : Fracture of the hamate hook : Hand
腱断裂, 有鉤骨鉤状突起骨折, 手

●Abstract

We report a case of a subcutaneous multiple flexor tendon injury occurring secondarily to a hamate fracture. The patient sustained the hamate fracture while playing golf. The injury was diagnosed as a wrist sprain by a nearby doctor and was treated conservatively. The patient noticed an inability to flex the left little finger at one month after the injury and consulted another doctor. A carpal tunnel view revealed the hamate hook fracture. The patient was referred to Suzuka Kaisei General Hospital with the diagnosis of a hamate hook fracture with ruptures in the flexor tendons of the little finger. The flexor digitorum superficialis (FDS) of the index, long and ring fingers and the flexor digitorum profundus (FDP) of the long and ring fingers were each partially ruptured. Both FDS and FDP of the little finger were completely ruptured. The rough surface of the fracture ends appeared to have caused the attritional ruptures in the tendons. Treatment by excision of the fractured hook and by interposed tendon graft produced satisfactory results.

●要旨

有鉤骨骨折に二次的に合併した屈筋腱皮下断裂例は極めて稀で、本邦では我々の症例を含めて5例、外国文献でも10数例を認めるのみである。

我々はゴルフプレーヤーの同様の症例を経験し、遊離腱移植術で満足する結果を得たので報告する。

症例；60歳男子，銀行員，1994年8月ゴルフショットの時，左手掌部に激痛が起こり，近医で理学療法等の治療を受けていた。1994年12月症状不変のため，津生協病院を受診，小指屈筋腱皮下断裂の診断を受けた。1995年2月機能再建のため当院に入院，1995年3月有鉤骨骨折片摘出術，小指屈筋腱遊離腱移植術を施行した。

手術所見；鋭利な骨片，骨折端により示指 FDS，中，環指 FDS，FDP はささら状で部分断裂，小指 FDS，FDP は完全断裂であった。ささら状の腱は，running suture で可及的修復を行い，小指に対して長掌筋腱の移植にて再建した。

A subcutaneous rupture in the flexor tendon secondary to a hamate hook fracture is extremely rare and only four cases have been reported in Japan. A thorough review of the literature could found only ten cases outside Japan¹⁻⁵⁾. Here we report an additional case.

Case Report

A sixty-year-old male bank employee.

The patient felt and acute pain in the palm of the left hand while playing golf in August, 1994. He consulted a nearby doctor who diagnosed the injury as a wrist sprain. He noticed a difficulty in flexing the left little finger at one month after the injury. He then visited Tsu Cooperative Association Hospital in December, 1994.

The left little finger was in an extended posi-

tion. A physical examination revealed loss of active flexion of the little finger both at the distal interphalangeal and the proximal interphalangeal joints. Although routine X-rays revealed no skeletal abnormalities, a carpal tunnel view clearly revealed a fracture in the hamate at its base (Fig. 1). He was referred to Suzuka Kaisei General Hospital with a diagnosis of the fracture of the hamate hook with subcutaneous flexor tendon ruptures in the little finger, in February, 1995.

A CT scan performed at Suzuka Kaisei General Hospital confirmed the findings of the carpal tunnel view (Fig. 2).

The patient underwent surgery in March, 1995.

Surgical findings:

With the pisiform as a landmark, a zigzag incision was made to expose the carpal tunnel and Guyon's canal. The flexor digitorum superficialis (FDS) tendons of the index, long and ring fingers were each partially ruptured and frayed for 5 cm. The flexor digitorum profundus (FDP) tendons of the long and ring fingers were also partially ruptured and frayed (Fig 3). Both the FDS and FDP tendons of the little finger were completely ruptured. The proximal as well as distal ends of the tendons were so frayed that more than 6 cm of the tendons had to be resected to obtain ends with normal structure. All tendon ruptures occurred at the level of the hamate hook.

The hamate hook was completely fractured at its base. The fractured fragment protruded into



Figure 1 : Routine X-rays did not reveal any skeletal abnormality.

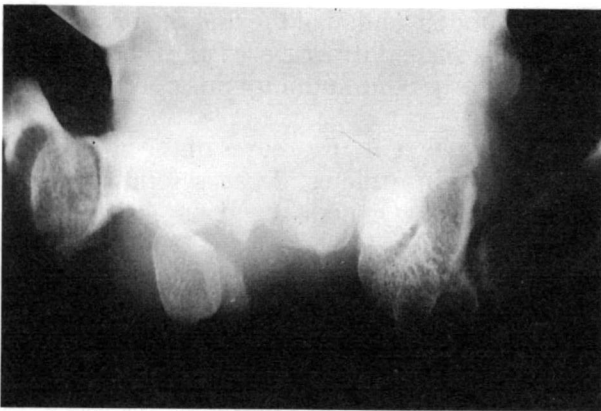


Figure 2 : Carpal tunnel view clearly demonstrated a fracture at the base of the hook of the hamate.

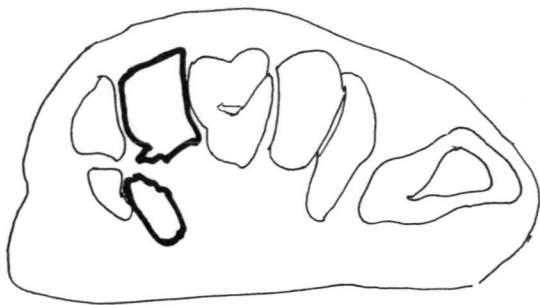


Figure 3 : CT revealed the hamate hook fracture and the displacement of the fragment more clearly than did the carpal tunnel view.

the Guyon's canal with a sharp spicule facing the ulnar nerve. The rough surface of the hamate appeared to have caused the attritional ruptures in the tendons. The fractured hook was excised and the fracture surface of the hamate was smoothed. The grinding bed of the tendons was repaired by covering the fractured surface with surrounding soft tissue. The partially ruptured FDS and FDP tendons of the index, long and ring fingers were repaired by running sutures with 6-0 nylon thread. The FDP tendon of the little finger was repaired using palmaris longus interposed tendon graft.

At the final follow-up, the patient was free of pain with full normal range of motion of the little finger restored (Fig. 4).

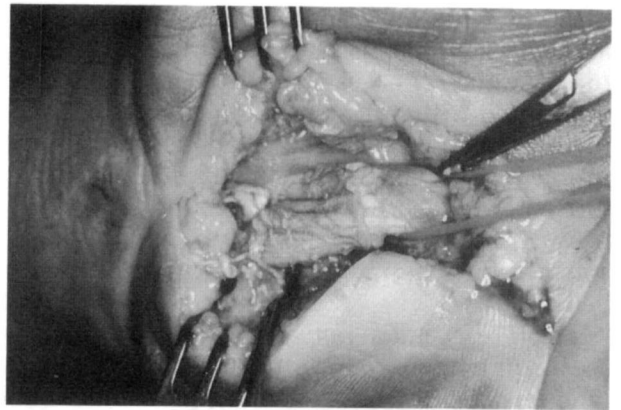


Figure 4 : Flexor tendons were partially ruptured and severely frayed at the level of the hamate hook.

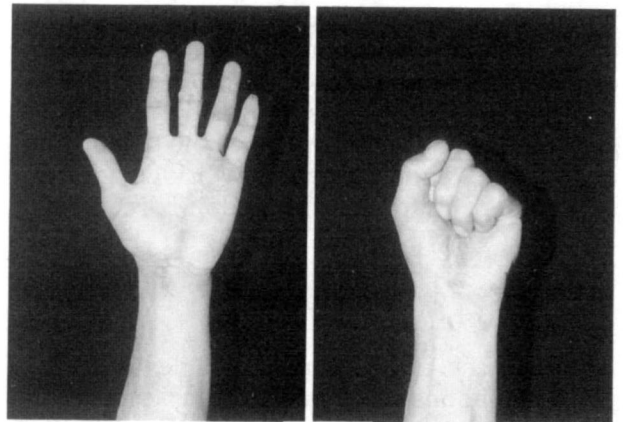


Figure 5 : Finally, the full range of motion of the little finger was restored.

Discussion

A subcutaneous flexor tendon rupture is a rare injury and, when it does occur, the tendon is usually ruptured at the distal insertion. A flexor tendon rupture secondary to a hamate hook fracture is extremely rare. Only 14 cases have been reported to date¹⁻⁵⁾.

Since routine X-rays do not demonstrate the base of the hamate hook, the fracture can be missed by general practitioners and treated as wrist sprain. Patients are sometimes recommended to use the injured hand despite complaining of pain. As seen in the present case, if the fracture end of the hamate forms sharp spicules, frequent tendon movement over the spicule can lead to attritional ruptures in the tendons.

Milek reviewed the English-language literature and found 127 cases of hamate hook fractures. Of the 127 cases, 18 cases were found to be associated with a flexor tendon rupture or fraying⁴⁾. Although the true incidence of tendon problems associated with a hamate hook fracture may not be inferred from this type of review a tendon injury secondary to a hamate hook fracture may be more common than generally believed.

The flexor tendon injury is usually confined to the flexor tendons of the little finger and there are few reported cases with multiple tendon injuries as in the present case.

To prevent secondary rupture, an accurate initial diagnosis of the hamate hook fracture is indispensable. CT and carpal tunnel view are effective diagnostic examinations. If the displacement of the fracture is extensive, then excision of the fracture fragments should be considered as soon as possible. Once a tendon rupture occurs, end-to-end repair is impossible on most occasions due to severe fraying of the tendon, and end-to-side tendon repair or bridge grafting using the palmaris longus tendon is required.

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95年度 JOSSM/KOSSM-GOTS Travelling Fellow 報告

京都府立医科大学 麻生 伸一



マウンテンバイクツアー出発前のまだ元気な4人。左から李先生，私，景先生，田中先生。フランクフルト郊外ハーナウにて。

JOSSM (日本整形外科スポーツ医学会), KOSSM (韓国整形外科スポーツ医学会) と GOTS (ドイツ, オーストリア, スイス整形災害外科スポーツ医学会) の間の travelling fellow の交換は今回で5回目になります。私のボスである平澤教授にご推挙をいただいたお蔭もあり，今年の fellow に何故か私が選ばれてしまいました。うれしさ半分，ほんまに私でええのかなという不安半分で，あわただしく準備を行い，医局の先生方の羨望の眼差しと罵声を後にして，5月24日から6月26日までドイツ，オーストリア，スイスを回ってきました。旅程を簡単に述べますと，まずドイツのエッセンをかわきりに，次にフランクフルト，スイスではバーゼル，ダボスを訪れ，オーストリアはウィーン，ルスト，最後に再びドイツに戻りミュンヘンで行われた GOTS の学術集会に出席して帰ってきました。それぞれの都市で2-7日過ごし，移動はすべてユーロシティなどの列車でした。

奈良県立医科大学の田中康仁先生，韓国ソウル（京城）大学の李（Myung Chul Lee）先生，キュンボク（慶北）大学の景（Hee Soo Kyung）先生と私の4人で，ドイツ語圏ヨーロッパを broken English のみを駆使して制覇？してきました。以下，項目別に旅の報告をしていきます。

<口演発表>

出発前の予定では，GOTS を含めて4回の paper presentation（口演）を行うはずだったのですが，行ってみると，とんでもないことに各地で1回以上の口演を頼まれ，結局計8回発表してきました。今回の fellow は各々2-4題の演題を用意していたので，うまくやりくりすることができました。医局員が10人位集まった小さな会から，200人以上の GOTS まで規模は様々でしたが，どの会でも活発なディスカッションがあり，お互いにたどたどしい英語を操りながら相互理解に努めていました。我々が

訪れた3ヶ国のドクター達は、日頃英語を喋らないので口は重いのですが、いったん喋り出すと基本的には我々より英会話は上手で、しかもゆっくり話してくれるので（早くは喋れないので）とても助かりました。時々、アメリカに留学経験のあるドクターが質問にたち、流暢な American English でまくしたてることもありましたが、現地のドクター間にもひんしゅくの空気が漂っていました。ちょうど、関西生まれなのに東京弁を使う奴を「なんやーあいつ」とかいうのと同じなのかも知れません。

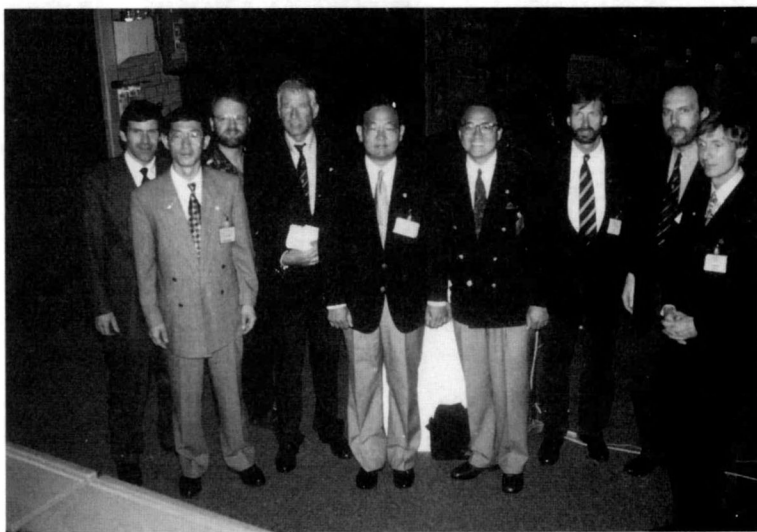
<病院見学>

ウィークデイのスケジュールは、早朝からカンファレンスに出席し、午前中は手術見学、昼食を職員食堂でとり、午後は病棟やリハビリテーションを見学するというパターンがほとんどでした。10床程のプライベートクリニックから空港ビルよりも大きいと

う点は、リハビリテーションであると思います。どこの施設でもスポーツの患者に限らず、PTが丁寧にPNF（Proprioceptive Neuromuscular Facilitation）を中心に1対1のリハを行っていました。術後もほとんどギプスや装具は使わず、筋力や proprioception を出来る限り損なわない方法を重視していました。例えば、ATFL（前距腓靱帯）新鮮断裂の治療でも、多くの施設では手術後、保存療法を問わずギプスは巻かず、adidas 社製の治療シューズを初めから用いていました。日本では、conservative treatment と言えばギプス固定または放置を意味する事が多いのですが、今回の旅行で、conservative treatment におけるこのような functional treatment の重要性を学んだことは私にとって収穫でした。

<観光>

滞在した各都市では、これまでに日本、韓国に fellow



GOTS のスタッフ、昨年の fellow 達と。左から4人目が GOTS の会長 Prof. Rosemeyer です。GOTS 会場（ミュンヘン）にて。

思われるウィーン大学総合病院まで大小14の病院をまわりました。手術適応や手術法は基本的には日本と変わりはないのですが、手術件数がやたらと多く朝から晩まで手術室にいて、外来、病棟を含めて患者を診察するのは週に半日だけというドクターもいました。症例数が多いこともあり、また教育がしっかりしていることもあってか、どのドクターも手術が上手なのには驚きました。しかし、最も日本と違

として来たドクター達がホスト役を務めてくれました。滞在中のスケジュールの作成、ホテルの手配や病院見学の調整などはもちろんのこと、土、日の休日にはワゴン車を自ら運転して観光に連れていってくれました。印象に残っているものを列挙しますと、デュッセルドルフでのワールドチームカップテニス選手権、ドイツ卓球選手権、フランクフルト郊外でのマウンテンバイクツアー、ビュルツブルグのレジ

デンツ、ロマンチック街道、セスナ機によるアルプス見物、スイス警察のボートに乗ってライン川観光、ウィーンオペラ座でのオペラ、Musikvereinでのクラシックコンサート、シェーンブルン宮殿、リゾート地ルストでのゴルフ、ミュンヘンのオリンピック公園などなど、普通の観光ツアーではとても望めないような、バラエティに富んだ貴重な経験をさせてもらいました。ホスト側としては、自分達が日本や韓国で受けた歓待にお返しをしようとして相当気合が入っていたようです。そのため、本来、休日である土、日のスケジュールはややもするとウィークデーよりもタイトになりました。朝7時にホテルを出発して、帰ってくるのは11時を過ぎるということもしばしばでした。この時期のドイツ周辺は日が暮れるのが夜の10時ころですので、いやというほど観光の時間がとれるわけです。travelling fellowとしてsurviveする(むこうのホスト達はsurviveという言葉を使っていました。その通り!)には相当の体力を必要とすることを実感しましたが、私達は元気にsurviveして帰ってきました。

<食事>

出発前、一番心配だったのは食べ物のことでした。「ソーセージ以外はむちゃくちゃまずい。」「パンはゴルフボールより硬い。」などなどかんばしい評判は皆無で、一カ月もいったい何を食ったらいいのか不安でした。しかし、行ってみると何とかなるもので、ホストが食事の度にメニューの一字一句を英語になおして説明してくれたおかげで、いろいろなものを食べて楽しむことができました。でもやはり、脂っこいものが多く、一皿の量が日本の二倍以上もある時もしばしばで、これには少し閉口しました、また意外なことに、高級レストランでも味付けはかなり塩辛くて、やむなく?ビールをたくさん飲んでしまったということもよくありました。そうそう、ビールやワインの話もしなければなりません。ビールについてはみなさんもよくご存じのことでしょうが、どこの土地のビールも個性があり、しかもどれももうまい、というのが私の感想です。量的には、ミュンヘンの人びとがダントツでした。他の土地では、私以上に飲む人はいなかったのですが、ミュンヘンのホスト達にはいませんでした。日本ではドイツワインはフルーティな甘口という印象が強いのですが、これは

リースリング種というブドウから作られたワインが日本に多く入ってきているためだと思います。実際はリースリングの辛口もあり、他のブドウから作られたワインも辛口で美味しいのがたくさんありました。辛口党の私も大満足でした。でも、日本で私がよくやるような、はじめはビールでそのあとワイン、という飲み方は向こうの人はやらないようで、時々、私はひんしゅくをかっていたようです。以上のような食生活を一カ月も送ってきたにもかかわらず、体重、GOT、GPT、γ-GTPなどの値は、出発前とかわりませんでした(私は以前から肥満とアルコール性肝炎で悩んでいたのですが…)。不思議です。私の体は向こうの食事にあっているのでしょうか?

<ザッハトルテ>

ところで、私はウィーンでパスポートの入ったバックを盗まれてしまいました。旅も終わりに近づき、ウィーンからミュンヘンへの列車に乗ろうとしたウィーン西駅でのことでした。時間があるのでコーヒーでも飲もうと、駅構内のレストランに他のfellowとウィーンのホストと私とで入りました。新しくて広々としたレストランで、客も少なく、怪しい人物などまったく見られませんでした。私はパスポート、現金、カメラなどの入ったショルダーバッグを椅子の下に置きました。コーヒーを注文してから、「あっそーだ、まだザッハトルテ(ウィーン名物のチョコレートケーキ)を食べていなかったんだ。」と私が気づき、みんなもこれに強く同意したため、左前方2メートルにあるケーキのショウケースに向かって1-2歩席を立てて乗り出しました。この間約20秒。コーヒーとケーキが来て、歓談しながら食べ終えて、さあ、列車に乗ろうと立ったときにバッグが無いのに気づきました。やられたー。時すでに遅し。私の後ろの席にいたドイツ人の老夫婦はもうどこにもいませんでした。結局、私だけミュンヘンには行けず、ウィーンに居残りとなりました。駅の警察で盗難証明をもらい、ホテルに戻り、心細い夜を過ごしました。「このままミュンヘンへ行けずにGOTSに出席できなかったらどうしよう。ハラキリもんやなー。」などとかなり弱気になっていました。翌朝、日本大使館に向かい、パスポート再発行の手続きをとりました。係員とは、防弾ガラスを隔ててインターホンで話をし、書類などのやりとりはその下の引出しを使うという

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日本整形外科スポーツ医学会

日本整形外科スポーツ医学会会則

第1章 総 則

- 第1条 名称
本会の名称は、日本整形外科スポーツ医学会（The Japanese Orthopaedic Society for Sports Medicine）略称、JOSSMという
以下、本会という
- 第2条 事務局
本会の事務局を、横浜市中区新山下3-2-3
横浜市立港湾病院内に置く

第2章 目的および事業

- 第3条 目的
本会は、整形外科領域におけるスポーツ医学並びにスポーツ外傷と障害の研究の進歩・発展を目的とし、スポーツ医学の向上とスポーツの発展に寄与する
- 第4条 事業
本会は、第3条の目的達成のために次の事業を行なう
- 1) 学術集会の開催
 - 2) 機関誌「日本整形外科スポーツ医学会雑誌」（Japanese Journal of Orthopaedic Sports Medicine）の編集・発行
 - 3) 内外の関係学術団体との連絡および提携
 - 4) その他、前条の目的を達成するに必要な事業

第3章 会 員

- 第5条 会員の種類
本会の会員は、次のとおりとする。
- 1) 正 会 員 本会の目的に賛同し、所定の登録手続きを行なった医師
 - 2) 準 会 員 本会の目的に賛同し、所定の登録手続きを行なった正会員以外のもの
 - 3) 特別会員 現在および将来にわたり本会の発展に寄与する外国人医師
 - 4) 名誉会員 本会の発展のために、顕著な貢献をした正会員および外国の医師のうちから、理事長が理事会及び評議員会の議を経て推薦するもの
 - 5) 賛助会員 本会の目的に賛同し、所定の手続きを行なった個人または団体
 - 6) 臨時会員 上記1～4の会員ではなく、本会の学術集会に出席し、会場費を支払った個人または団体
- 会員期間は、その学術集会の期間とする
- 第6条 入会
本会の正会員、準会員または賛助会員として入会を希望するものは、所定の用紙に記入の上、会費をそえて、本会事務局に申し込むものとする
入会資格は別に定める
但し、特別会員および名誉会員に推薦された者は、入会の手続きを要せず、本人の承諾をもって、会員となりかつ会費を納めることを要しない

第7条 退会

- 1) 会員が退会しようとするときは、本会事務局に届けなければならない
- 2) 会費を2年以上滞納した場合には、退会したものとみなす

第8条 除名

本会の名誉を傷つけ、また本会の目的に反する行為のあった場合、理事会は会員を除名することができる

第4章 役員、評議員

第9条 役員

本会には、次の役員を置く

- 1) 理事 若干名を置く（うち理事長1名、常任理事若干名）
- 2) 監事 2名

第10条 役員の選出

- 1) 理事長および常任理事は、理事会において理事の中から選出する
- 2) 理事および監事は、評議員の中から選出し、総会の承認を要する

第11条 役員の業務

- 1) 理事長は、会務を統括し本会を代表する
- 2) 理事は、理事会を組織し重要事項を審議、決定する
- 3) 常任理事は、理事長を補佐し常務を処理する
- 4) 監事は、本会の会計および会務を監査する

第12条 役員の任期

役員の任期は3年とし、再任は妨げない

第13条 評議員

- 1) 本会には50名以上100名以内の評議員を置く
- 2) 評議員は正会員の中から選出する
- 3) 評議員は評議員会を組織して、本会役員の選出を行なうほか、理事会に助言する
- 4) 評議員の任期は3年とし、再任は妨げない

第5章 委員会

第14条 委員会

理事会は必要に応じて、委員会を設けることができる

第6章 会 議

第15条 理事会

- 1) 理事会は理事長がこれを召集し、主宰する
- 2) 会長は理事会に出席できる

第16条 総会および評議員会

- 1) 総会は正会員および準会員をもって組織する
- 2) 総会および評議員会は、それぞれ年1回学術集会開催中に開催する
- 3) 総会および評議員会の議長は、理事長または、理事長の指名した者とする
- 4) 臨時総会および臨時評議員会は必要に応じて、理事長がこれを召集できる

第7章 学術集会

第17条 学術集会

- 1) 学術集会は年1回開催し、会長がこれを主宰する
- 2) 会長、次期会長は理事会の推薦により、評議員会および総会の承認を経て決定する
- 3) 学術集会での発表の主演者および共同演者は、原則として本会の正会員に限る

第8章 会費および会計

第18条 正会員、準会員および賛助会員の年会費は別に定める

第19条 本会の経費は会費、および寄付金その他をもってこれに当てる

第20条 本会の目的に賛同する個人および団体から寄付金を受けることができる

第21条 本会の収支予算および決算は理事会の決議を経て評議員会、総会の承認を得なければならない

第22条 既納の会費は、これを返還しない

第23条 本会の会計年度は、4月1日に始まり、翌年の3月31日に終わる

第9章 附 則

第24条 本会則の改正は、評議員会において、出席者の過半数以上の同意を必要とし、総会の承認を要する

附 記 本会則は、昭和57年6月5日から施行する
本改正会則は、昭和63年4月1日から施行する
本改正会則は、平成4年6月1日から施行する
本改正会則は、平成6年6月17日から施行する

名誉会員・特別会員

青木 虎吉
今井 望
河野 左宙
榊田喜三郎
鈴木 良平

高岸 直人
津山 直一
鞆田 幸徳
鳥山 貞宣
廣畑 和志

Bernard R. Cahill
Wolf-Dieter Montag
W. Pforringer
George A Snook

理事

井形 高明
生田 義和

石井 清一
高澤 晴夫 (理事長)

田島 直也
中嶋 寛之

原田 征行
守屋 秀繁

監事

東 博彦

廣畑 和志

評議員

赤松 功也
秋本 毅
阿曾沼 要
阿部 正隆
有馬 亨
井上 一
今井 立史
今給黎篤弘
入江 一憲
上崎 典雄
大久保 衛
大畠 襄
岡崎 壯之
岡村 良久
越智 隆弘
越智 光夫

加藤 哲也
菊地 臣一
城所 靖郎
栗山 節郎
黒坂 昌弘
黒澤 尚
古賀 良生
腰野 富久
小山 由喜
斉藤 明義
左海 伸夫
阪本 桂造
酒匂 崇
佐々木鉄人
佐藤 光三
史野 根生

柴田 大法
霜 礼次郎
白井 康正
須川 勲
菅原 誠
高尾 良英
高倉 義典
竹下 満
竹田 毅
田島 寶
立花 陽明
田中 寿一
田渕 健一
土屋 正光
戸松 泰介
富永 積生

丹羽 滋郎
乗松 敏晴
乗松 尋道
初山 泰弘
林 浩一郎
平澤 泰介
廣橋 賢次
福田 眞輔
福田 宏明
福林 徹
藤巻 悦夫
星川 吉光
増島 篤
松井 宣夫
松崎 昭夫
圓尾 宗司

萬納寺毅智
宮津 誠
宮永 豊
武藤 芳照
茂手木三男
森 雄二郎
安田 和則
矢部 裕
山本 博司
山本 龍二
横江 清司
吉松 俊一
龍 順之助
若野 紘一
渡辺 好博
渡会 公治

(敬称略)

賛助会員

(95年度)

旭化成工業株式会社
アルケア株式会社
石井医科工業株式会社
科研製薬株式会社
三共株式会社
三進興産株式会社
塩野義製薬株式会社
清水製薬株式会社
株式会社武内義肢製作所
中外製薬株式会社
日本シグマックス株式会社

株式会社日本メディックス
日本ルセル株式会社
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株式会社ヘリオ
株式会社松本医科器械
株式会社メディカル・システム・サービス
森下ルセル株式会社

学術集会について

第22回 日本整形外科スポーツ医学会

- 会 長 林浩一郎（筑波大学臨床医学系整形外科教授）
開催地 つくば市ノバホール，筑波第一ホテル
開催日 平成8年8月28日（水）スポーツアクティビティデー
ゴルフ 50組 7：30スタート（茨城県 G. C.）
平成8年8月29日（木）午後各種目
アンケート調査を行い，会員の希望する種目にはできるだけ対応できるように準備中です。
- 主 題 1. スポーツ種目別の身体特性と傷害特異性
2. スポーツ外傷・障害における MRI の有用性
3. アスレチックリハビリテーションと外傷・障害後のスポーツ復帰

教育研修講演：

- 「最新のトレーニング理論」
筑波大学体育科学系 村木征人先生
「スポーツと栄養」
筑波大学体育科学系 鈴木正成先生

市民公開講座：

- 8月31日（土）：特集「スポーツ医学」
成長期のスポーツ傷害
スポーツと腰痛
オリンピックにおける傷害
等を予定しております。

連絡先

〒305
茨城県つくば市天王台1-1-1 筑波大学臨床医学系整形外科
第22回日本整形外科スポーツ医学会準備事務局
Tel (0298) 53-3219
Fax (0298) 53-3214

第23回 日本整形外科スポーツ医学会

- 会 長 茂手木三男（東邦大学医学部整形外科教授）

第4回 日韓整形外科スポーツ医学国際会議

開催日：平成8年5月30日(木)～31日(金)

スポーツアクティビティー：5月30日(木)

ゴルフ、登山

学術集会：5月31日(金)

会場：鯉ヶ沢プリンスホテル

青森県西津軽郡鯉ヶ沢町長平町

TEL. 0172-72-1011 FAX. 0172-72-1311

演題募集：1) シンポジウム：離断性骨軟骨炎の診断と治療

2) 一般演題

シンポジウム、一般演題を募集します。

演題申込み用紙、学会参加申込み、宿泊案内などは、下記事務局までハガキまたはFAXにて住所、氏名をご記入の上ご請求ください。

演題締切り：平成8年2月29日

事務局連絡先：〒036 青森県弘前市在府町5

弘前大学医学部整形外科学教室内

第4回 日韓整形外科スポーツ国際会議事務局

TEL.0172-33-5111

FAX.0172-36-3826

第4回日韓整形外科スポーツ国際会議

会長 原田 征行

お知らせ

日本整形外科スポーツ医学会 年会費について

金 額 : 1995年度 12,000円

納入方法 : 1) 銀行振込—なるべく学会雑誌に綴込んである振込依頼書をご利用下さい。払込金受取書が領収書となりますので、各自保管して下さい。

振込依頼書のない場合は、下記口座宛お振込願います。その際、必ず個人名でお振込下さい。(大学名、病院名で振込まれますと入金の確認できない場合があります。)

さくら銀行 横浜支店
普通預金 6318135
日本整形外科スポーツ医学会

- 2) 自動振替—所定の用紙に必要事項をご記入、捺印の上、事務局宛送付願います。(但し、1995年度年会費については既に振替処理を終了しておりますので、これからお申し込みの方は、1996年度以降の適用となります。)

※振込依頼書、及び自動振替依頼書は、学会雑誌(毎年 No. 1 巻)に綴込んでありますが、ご必要の際は事務局までご請求下さい。

※学会雑誌 (No. 1 巻)には、既に年会費を振込まれた方、自動振替の手続きをされた方にも各依頼書は綴込んでありますので、二重支払いにならないようご注意願います。(支払い済みか、否かご不明の方は、事務局迄お問い合わせ願います。)

※毎年12月末日迄に当該年度の年会費を納めた会員に、翌年発行の学会雑誌を送付致します。未納の方は、期日迄に必ずお振込み下さい。

※2年以上年会費を滞納されると、自動退会となりますので、ご注意願います。

学会開催のお知らせ

第8回日本肘関節研究会

- 会 期：平成8年2月17日（土）
会 場：コクヨホール
〒108 東京都港区港南1-8-35
TEL 03-3450-3712
- 主 題：1. 肘関節の診断・治療の基礎
2. 小児肘関節外傷
3. 肘関節のスポーツ外傷・障害
4. 肘部神経障害
5. RA 肘（人工関節を含む）
6. 肘変形・拘縮の治療
- 連絡先：〒142
東京都品川区旗の台1-5-8
昭和大学医学部整形外科学教室内
TEL 03-3784-8543
FAX 03-3784-3509

第8回日本肘関節研究会
会長 藤 巻 悦 夫

第23回 日本肩関節学会

会 期：1996年10月31日(木)～ 11月1日(金)

会 場：大宮ソニックシティ大ホールほか

埼玉県大宮市桜木町1-7-5 (JR 大宮駅西口)

招待講演：Multidirectional Instability of the Shoulder

John J. Brems(Cleveland Clinic Foundation)

演題募集：主題 1. 腱板不全断裂の診断

2. 肩のMDI

3. スポーツ肩障害

一般演題

肩に関する基礎および臨床演題

応募方法：第1次締切 1996年5月30日(必着)

官製はがきに演題名、演者名、所属、抄録用
紙送付先をご記入でお申込み下さい。

第2次締切 1996年6月30日(必着)

学術集会事務局：〒730 東京都板橋区大谷口上町30-1

日本大学医学部整形外科学教室

第23回日本肩関節学会

会長 佐野 精司

TEL. 03-3972-8111(内線2493-5)

FAX. 03-3972-4824

県・市民公開講座：1996年11月2日(土)

午前10時～12時

肩のいたみ 三 笠 元 彦 先生

田 畑 四 郎 先生

藤 原 誠 先生

第4回 よこはまスポーツ整形外科フォーラム

演題募集のお知らせ

「第4回よこはまスポーツ整形外科フォーラム」を下記の要項で開催いたします。
本会は、従来の形式にとらわれず、自由な討論のできる場でありますので、多くの方々の参加をおまちしております。

なお、今回は第2回と同様、ドイツ、オーストリア、スイスからのフェロー4名と、韓国より日韓整形外科スポーツ医学国際会議に出席された先生方も参加されます。

「第4回よこはまスポーツ整形外科フォーラム」
代表世話人 青木 治人(聖マリアンナ医科大学整形外科)

概 要

会 期：平成8年6月2日（日）

場 所：横浜シンポジア
横浜市中区山下町2 産業貿易センタービル9階
TEL 045-671-7151

プログラム：午前 一般演題（討論中心）
午後 パネルディスカッション
「アキレス腱皮下断裂の治療法の検討」
特別講演：日整会教育研修講演（予定）
展示、懇親会

会 費：¥3,000（教育研修会費を除く）

一般演題を募集します。

1 次 締 切：平成8年2月29日（木）
はがきに住所、氏名、所属、演題名を記入のうえ、下記事務局に送付して下さい。

抄 録 締 切：平成8年3月30日（土）
事務局の送付する用紙に800字以内で抄録を作成して下さい。
（図・表を含まない）

採用の採否は、代表世話人にご一任下さい。

事 務 局：〒231 横浜市中区新山下3-2-3 横浜市立港湾病院内
「よこはまスポーツ整形外科フォーラム」事務局
TEL & FAX 045-625-0744

日本整形外科学スポーツ医学会 1994年度 決算報告書

(1994年4月1日から1995年3月31日まで)

【収入の部】

科 目	1994年度予算額	1994年度決算額
1. 年 会 費	14,400,000 (12,000×1,200人)	20,422,000
賛 助 会 費	1,000,000	1,350,000
2. 雑誌掲載料	500,000	804,100
3. 広告掲載料	1,500,000	1,984,382
4. 雑 収 入	20,000	384,097
5. 前年度繰越金	1,900,527	1,900,527
合 計	19,320,527	26,845,106

【支出の部】

科 目	1994年度予算額	1994年度決算額
1. 学会雑誌発行費		
印刷費	7,500,000	6,873,000
発送用封筒等印刷費	200,000	251,835
発送費	1,500,000	1,486,620
2. 学術集会開催費	1,000,000	1,000,000
3. 委員会費 (運営・国際・編集)	2,000,000	1,329,466
4. 国際学術交流関係費	2,000,000	2,270,770
5. 運 営 費		
人件費	2,200,000	2,840,000
交通費	500,000	550,620
通信費	600,000	632,596
印刷製本費	300,000	198,891
消耗品費	200,000	163,883
雑費	200,000	58,008
6. 予 備 費	300,000	0
合 計	18,500,000	17,655,689

次年度繰越金	820,527	9,189,417
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上記決算は会計監査を受けた後、1995年6月29日に開催されました、理事会評議員会、及び7月1日の総会において承認されましたのでご報告致します。

公開講演会「産業空洞化問題を考える」開催さる

平成7年9月 日本学術会議広報委員会

今回の日本学術会議だよりでは、7月に開催された日本学術会議主催公開講演会「産業空洞化問題を考える」の概要について紹介します。

日本学術会議は、学術の成果を市民に直接還元するための活動として、日本学術会議会員が講師となって、市民を対象に年2回、日本学術会議主催の公開講演会を開催しています。

日本学術会議のグローバリゼーションと社会構造の変化特別委員会は、いわゆるグローバリゼーションの進展によって我が国の経済・社会が受ける諸種の影響と、それに伴う様々な問題点を吟味し、今後、我が国がとるべきそれらへの対応策の在り方を検討することをその任務とし、特に、現在の我が国にとっての最も重大な危機的事態とも言うべき「産業空洞化」の問題の分析に最重点を置いて、審議を進めつつあります。

今回の公開講演会では、この特別委員会によるそのような分析・審議の成果を踏まえて、3人の講演者によって、まず、(1)我が国の経済を全体として見てマクロ的に考察するという経済学的な視点からは、現在の長期不況と異常な「円高」に伴って余儀なくされつつある我が国産業の「空洞化」という事態をどう捉え、また、それに対応するべき経済政策はどうあるべきか、そして、次に、(2)技術工学的な観点からすれば、このような現在の状況はどのように把握され、また、それについて、どのような問題点が指摘されるべきか、そして、さらに、(3)企業経営の面から見た場合、このようなグローバリゼーションのインパクトはどのような意味を持ち、我が国の企業はどのようにそれに対応しつつあるのか、という3つの視角からの分析が行われました。

この講演会は、平成7年7月14日（金）の午後1時20分から、日本学術会議講堂において約200名の聴講者を集め開催されましたので、その概要をお知らせいたします。

◇次 第

- 司 会 吉田 民人（第1部会員）
- 1 開会の辞 利谷 信義（日本学術会議副会長）
- 2 挨拶 吉田 民人（第1部会員）
- 問題提起
- 3 講演

(1) 日本経済再生の方途

丹羽 春喜（第3部会員）

(2) 技術移転と空洞化

富浦 梓（第5部会員）

(3) グローバリゼーションと日本企業の多国籍化

岡本 康雄（第3部副部長）

4 質疑応答

5 閉会の辞 西島 安則（日本学術会議副会長）

◇問題提起

吉田 民人（第1部会員、中央大学文学部教授）

空洞化という言葉は、英語でフォローイングアウトと言われ、これが最初に問題になったのは1960年代のアメリカであり、当時ECにアメリカの自動車あるいは電機産業が出て、アメリカの労働組合が、ジョブ、つまり仕事の輸出であるということとかなり反対したといったようなところから始まって、日本でも、1960年代の後半には東南アジアに直接投資が開始されていた。もちろんこの種の問題は、経済のグローバリゼーションという、まさにグローバリゼーションと社会構造の変化特別委員会が担当しているテーマの一つであるが、その空洞化が特に最近、円高の状況の中で国際競争力の著しい低下を招くということで、ますます加速されるというふうにみられているわけで、この種のテーマをグローバリゼーションと日本の社会構造の変化の中でも最も緊急のテーマの一つとして取り上げることになった。

空洞化といっても産業の空洞化、金融の空洞化、技術の空洞化、あるいは産業の空洞化も生産の空洞化、経営の空洞化あるいは雇用の空洞化といったさまざまな側面があるわけで、主としてその辺の問題を「産業の空洞化」という一言である意味でラフに総括させていただいた企画である。

中身は三つあり、(1)日本経済をマクロ的な角度から見ての空洞化の原因とその対策について、(2)技術の空洞化に関して、(3)ミクロ的な企業がグローバリゼーションの中で国際化していく。まさにそういう意味で言えばミクロ的であると同時にグローバルな、その意味

でマクロ的な観点から、それぞれ講演が行われる。

ここで出る問題は多岐にわたるが、基本的には空洞化の原因の究明と、それに対する対応策という二つの側面からの講演となるが、例えば大蔵省の立場あるいは日銀の立場、あるいは地方公共団体の立場、あるいは企業の立場、それぞれの立場によって微妙に特殊利益が反映せざるを得ないような問題構造になっているが、研究者というのはそういう特定の、つまり職業的な集団の利益から比較的解放されて、非常に客観的な判断をすることができる職業集団に属していることから、できるだけ客観的に、一般的に特殊な利害にとらわれない角度からの検討をさせていただくことになっているので、研究者としてはこういう見方をしているんだということをぜひお聞きいただきたい。

◇日本経済再生の方途

～円高と産業空洞化問題をどう考えるべきか～

丹羽 春喜

(第3部会員、グローバリゼーションと社会構造の変化特別委員会委員長)

- ・ ケインズ 対 反ケインズ
 - ・ 経済学の50～100年の退歩
——ベトナム後遺症のニヒリズム——
 - ・ 政策の不合理性と長期経済停滞
 - ・ 三重の悪循環的ジレンマによる不況の永続化
 - ・ 「信賞必罰」システムのフロート制と「円高」の責め苦、そして産業空洞化
 - ・ 「低成長→低税収→財政赤字→緊縮財政→不況永続化」の悪循環
 - ・ 「リストラ不況」の危険性
 - ・ 20年以上もの超長期不況
 - ・ 結果としての「近隣窮乏化」政策（対外経済摩擦の根本的原因）
 - ・ 「正常な」国際分業と「異常な」空洞化とを混同するな
 - ・ ミスリーディングな「成熟経済」パラダイム
 - ・ 膨大なデフレ・ギャップ
——それを直視しようとしないう「経済白書」の危険性——
 - ・ 「規制緩和」、「リストラ」、「行革」、「市場開放」、等々の限界と欺瞞性
 - ・ 「合成の誤謬」の問題をまじめに直視しようとしないう風潮
 - ・ 朝野をあげての幼児化現象
 - ・ 必要な「最善のシステム」ビジョン（市場経済＋国民経済予算）への回帰
——むしろ、デフレ・ギャップこそ「真の財源」——
 - ・ 震災復興と被災者支援の政策はどうあるべきか
——国家の本質的な機能とは何か——
 - ・ 混迷からの脱却へ
- おおよそ、上記のような諸項目について、問題点を解

きあかし、日本経済再生の方途について、国民経済予算制度を現在の市場経済をベースにしている経済体制に組み込むべし等の提言を行いました。

◇技術移転と空洞化

富浦 梓(第5部会員、新日本製鐵㈱常任顧問)

製造業は全て技術の発明と、その移転によって、拡大、発展を成し遂げてきた。鉄鋼業における技術移転の歴史を振り返ってみると、一般的に技術の個人依存性が高いものほど移転が困難であり、技術の表象可能性の高いものほど移転が容易である事に気がつく。

技術の完全な表象には多くの困難が存在し、それ故に未だ経験に依存するところが多い。技術の表象可能性を高めるには、製造に伴って生ずる現象を分析して、基本過程を取り出し、それ等を統合して新たなシステムを発現するという行為の繰返しが必要とされる。

このような経験の科学化を継続的に行われないとすると、技術の空洞化が生じやすくなる。

このような点について着目し、技術移転と空洞化について、生産技術としての工学から社会技術としての工学へのシフト等の具体的提案としてまとめました。

◇グローバリゼーションと日本企業の多国籍化

岡本 康雄(第3部副部長、青山学院大学国際政治経済学部教授)

日本の製造企業は、1960年代後半東南アジアに生産拠点を軸とした海外直接投資を始めた。そして70年代に入ると、貿易摩擦回避がらみで米国向けの海外直接投資が、電機・電子、さらに乗用車といった分野において大規模に行われるにいたった。EUにも同じ様な分野での生産拠点の形成が進められた。この間、日本企業の競争優位資源の海外移転が果たしてどのように行われうるか、が重要な課題であった。

他方、世界規模では、各国、特に先進国間の所得水準の平準化と市場の同質化技術水準の均等化と革新の同期化が進み、情報通信技術の急速な進歩とそれによる伝達コストの低下、各国制度の自由化がこれに加わって、80年代国境なき経済——グローバリゼーションが急速に進展し、グローバル規模での競争が重要な課題であった。

そして80年代後半からは、アジアNIES、90年代にはアセアンが台頭し、東アジア全体がグローバルな注目を浴びるにいたっている。そして日本は、急速な円高によりアセアンへの生産移転を急テンポに進めざるをえなくなっている。それは、日本国内の空洞化を誘発している。

これら三つは、今現在、同時解決を求められている課題である。このトライアドについて考察しました。

※ なお、この講演会の模様については、前回の講演会と同様、日学双書No.24「産業空洞化問題を考える」として、㈱日本学術協力財団より刊行予定です。

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