

### Studies of Spondylolysis found among Weight Lifters.

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Lumbago will interfere with the daily activities of most people, even athletes. Low back pain is a not uncommon complaint in those who are participating in active membership of some kind of sport, the exact lesion depending upon the type of sport. In particular almost all weightlifters have experienced or have been suffering from low back pain as they continue their athletic activities. A great number of weightlifters were found to have a complaint of low back pain, especially at the time of taking some particular position, i.e. shifting the motion of clean action, or before and after press action in lifting the weight.

Sportsmen holding active membership in weight lifting, were examined concerning an episode of low back pain and physical and radiological examinations revealed significant abnormalities of lumbar spine.

Among those cases checked clinically, 8 out of 26 weightlifters were found to have spondylolysis. Interestingly, most of them have not been handicapped in their activities by low back pain, regardless of whether they were demonstrating spondylolysis or not. However, this high incidence of spondylolysis, being 30.7%, among weightlifters seems to require much more exact investigations.

The lesions of spondylolysis are clearly seen on radiographs of the usual oblique view of the lumbosacral spine. (Fig. 1)

The high incidence of spondylolysis in weightlifters in comparison with those of other people, being 5 to 7 per cent, may have some particular relationship between spondylolysis and the motion of the lifting of weights. The facts mentioned above persuaded us to carry out the following investigations.

#### Clinical survey and Clinical findings

Among 26 male weightlifters surveyed,

1. In 30.7 per cent, spondylolysis was found. The age distribution was from 18 to 24 years old, (Fig. 2, 3)
2. Next figure (Fig. 4) shows the relationship between the division of lifting weights and spondylolysis. It

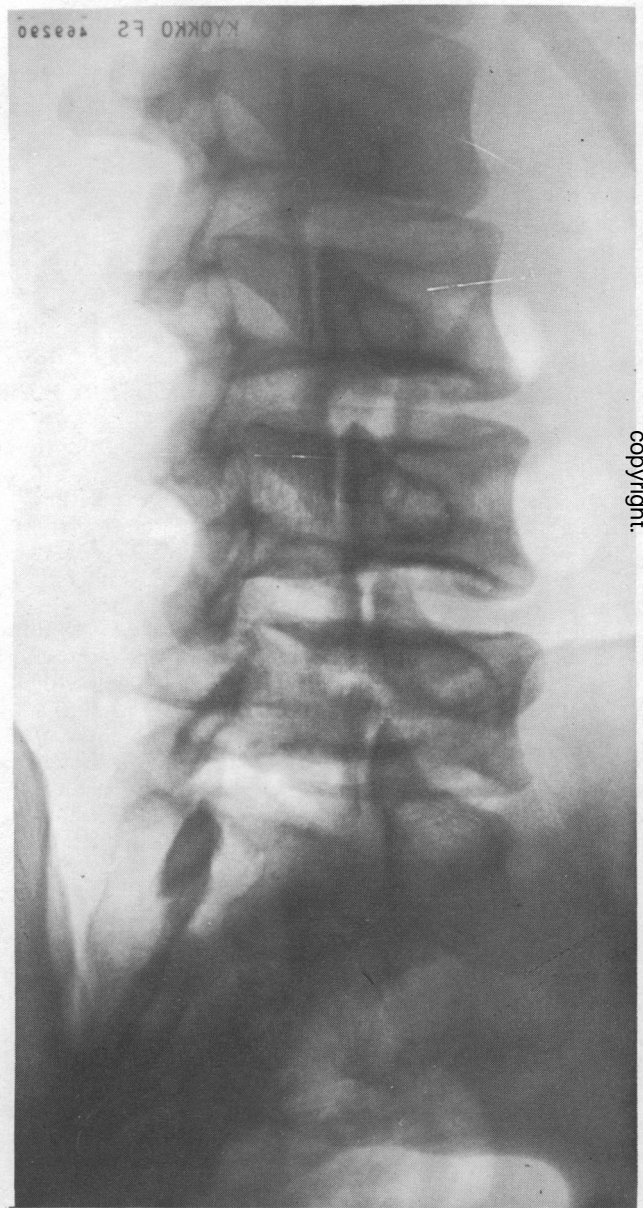
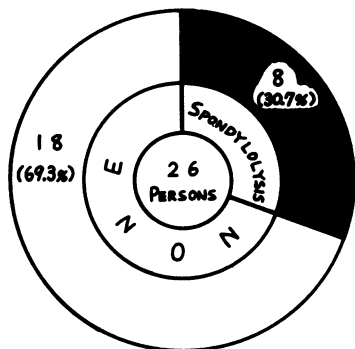


Fig. 1.

revealed the following number of spondylolysis; 4 competitors in middle-weight, 3 in light-weight and 1 in bantam-weight classes.

Fig. 2.

**INCIDENCE OF SPONDYLOLYSIS AMONG WEIGHT-LIFTERS**



3. There are two circular graphs, the left one is the ratio of all members of the weightlifting group, the right one is the incidence of spondylolysis amongst them. As indicated by three kinds of shading (the white mark means no episode of lumbago, the speckled mark means occasional complaint of low back pain and the black mark means persistent lumbago.) Only 2 competitors have no episode of lumbago. The rest of them complain of low back pain. Especially in cases of spondylolysis, they all complain of low back pain, to some degree. (Fig. 5)

Fig. 5

**RELATION BETWEEN LUMBAGO AND SPONDYLOLYSIS AMONG WEIGHT-LIFTERS**

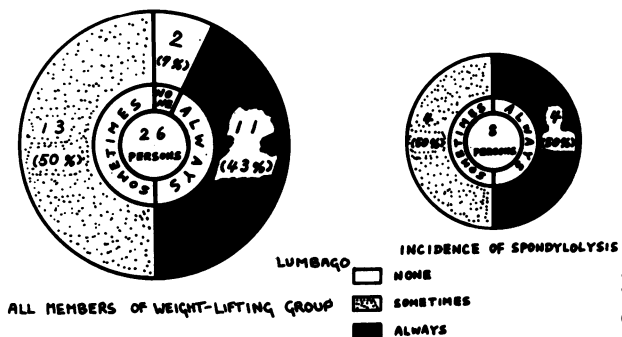
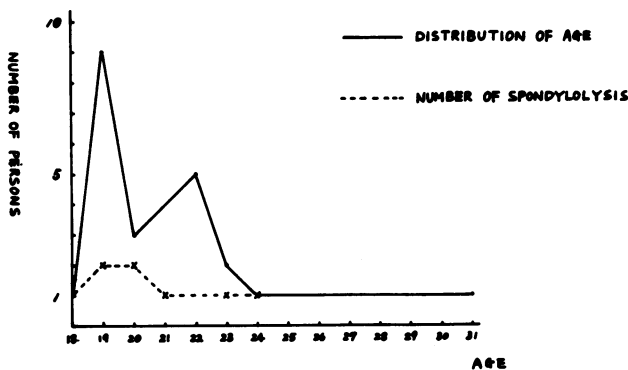


Fig. 3

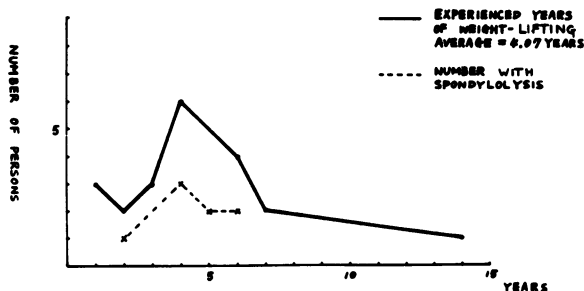
**RELATION BETWEEN DISTRIBUTION OF AGE AND SPONDYLOLYSIS**



4. Next figure (Fig. 6) indicates relationship between participating in lifting weight and the incidence of spondylolysis. It can be pointed out that spondylolysis among experienced competitors of 2-6 years, especially in those with 4 years experience, players show a high incidence.

Fig. 6

**RELATION BETWEEN YEARS EXPERIENCED (IN WEIGHT-LIFTING AND SPONDYLOLYSIS**



**RELATION BETWEEN WEIGHT-LIFTING WEIGHT CLASS AND SPONDYLOLYSIS**

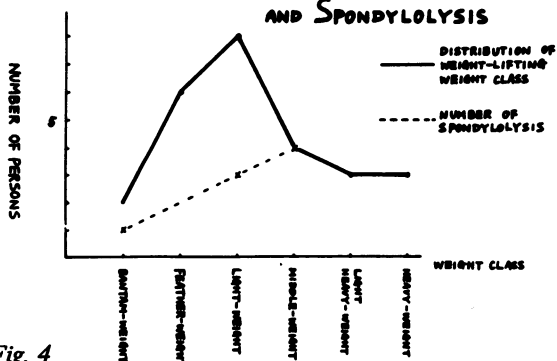
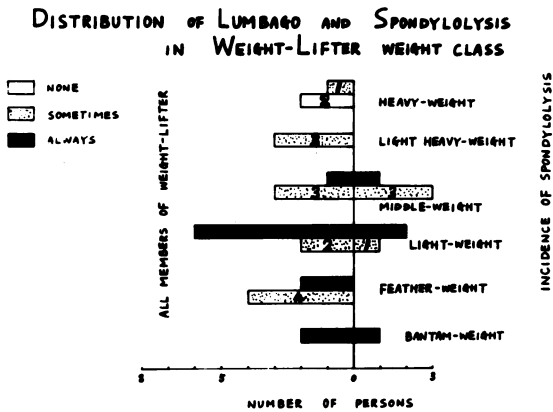


Fig. 4

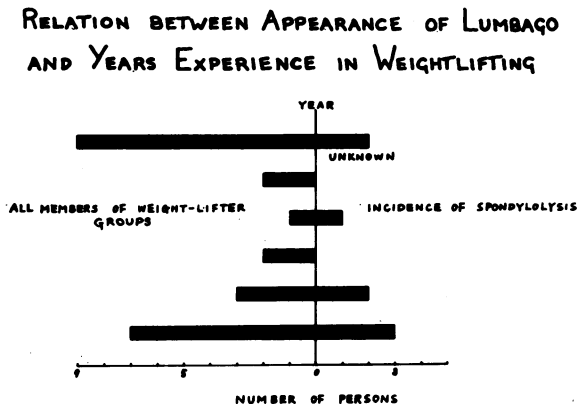
5. Fig. 7 shows the distribution of players who are classified according to the severity of low back pain, division of the classes of the weightlifters and spondylolysis. The columns of the left side on the graph show the number of players being divided by the degree of lumbago over all weightlifters, the right side of the graph also presents the distribution of the weightlifters involved in spondylolysis according to the duration of lumbago. It can be said that there is a significantly higher incidence of spondylolysis accompanied by low back pain in the classes lighter than middle-weight.

Fig. 7



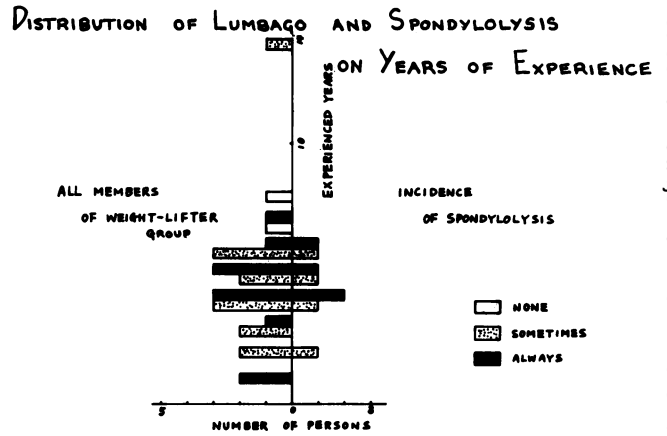
6. There might exist some correlation between the years of experience and the appearance of lumbago; that means most will be troubled with low back pain during the initial first to third years as shown in Fig. 8.

Fig. 8



7. Fig. 9 shows the distribution of the weight lifters with or without low back pain, of spondylolysis and of the years experience in the sport. Spondylolysis was mostly found in players who had more than 4 or 5 years experience.

Fig. 9



8. The results of our clinical survey of weightlifters are listed in the table. Radiologically 8 cases of spondylolysis being 30.7 per cent, 4 cases of deformity of the lumbar spine, 15.3 per cent, and 2 cases of spina bifida occulta, 7 per cent, were found, though they have never complained of any radicular symptom nor radicular low back pain. (Table 1)

Table 1.

CLINICAL FINDINGS AMONG WEIGHT-LIFTERS (26 PERSONS)

ROENTGENOLOGICAL FINDINGS	SPONDYLOLYSIS	
	SPONDYLOLYSIS	8 (30.7%)
	DEFORMITY OF LUMBAR SPINE	4 (15.3%)
	SPINA BIFIDA OCCULTA	2 (7%)
CLINICAL SYMPTOMS	STRAIGHT LEG RAISING TEST	+ 0
		- 26 (100%)
	TENDERNESS OF LUMBAR SPINE	+ 8 (30.7%)
		- 18 (69.3%)
	PAINFUL POINT ON PALPATION	+ 9 (23%)
		- 17 (77%)
TENDON REFLEX OF LOWER EXTREMITY	ABNORMAL 7 (26.9%)	
	NORMAL 19 (73.1%)	
SENSORY DISTURBANCES	+ 0	
	- 26 (100%)	

9. Fig. 10 shows the schema of the dynamic, functional roentgenogram of the lower part of the lumbar spine. The slipped vertebral body of the lumbar spine was noticed on the standing position radiograph. This abnormal motion of lumbar spine (slipping in dorsi-

flexion) can be classified into 3 categories,

1. Weightlifters with spondylolysis: 3 out of 8 = 37.5%,
2. normal weightlifters: 4 out of 18 = 22.2%
3. and normal adults: none out of 30.

**SLIPPED VERTEBRAL BODY OF LUMBAR SPINE  
ON STANDING POSITION  
(EXCEED 3mm → POSITIVE)**

OBJECTS	NUMBER OF PERSONS
WEIGHT-LIFTER WITH SPONDYLOLYSIS	3/8 (37.5%)
NORMAL WEIGHT-LIFTER	4/18 (22.2%)
NORMAL ADULT	0/30 (0%)

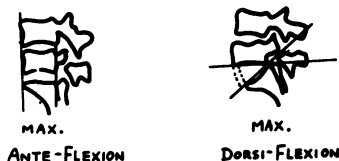


Fig. 10

Obviously there are difference between weightlifters and normal adults, i.e. in weightlifters the slipping vertebral bodies of the lumbar spine were found to have higher incidence on dynamic radiographs than in normal adults.

10. This shows whether the pedicle-facet angle of the 5th lumbar spondylolytic area is influenced by lumbar motion or not.

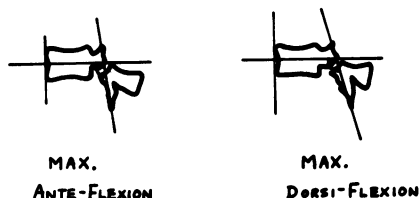
In order to study it, functional X-rays in the standing position were taken in maximum ante-flexion and maximum dorsi-flexion.

It revealed the difference of the angle in forward and backward flexion which indicated the presence of the irregular motion at the site of spondylolysis in both maximum positions. This abnormal mobility is considered as significant finding. (Fig. 11)

Fig. 11

**PEDICLE-FACET ANGLE (DEGREE)**

WEIGHT-LIFTER WITH SPONDYLOLYSIS	NORMAL WEIGHT-LIFTER
5.2	3.9



11. This figure (Fig. 12) will be able to show the characteristic pattern of lumbar lordosis between weightlifters and normal adults.

Calculation was made by means of the Ishihara's formula illustrated on the figure.

In these patterns more lordosis in normal adults than in weightlifters was noted. Not much difference of lumbar lordosis was found between weightlifters with spondylolysis and those without spondylolysis.

**CHARACTERISTIC PATTERN OF LUMBAR LORDOSIS  
BETWEEN WEIGHT-LIFTERS AND NORMAL ADULTS**

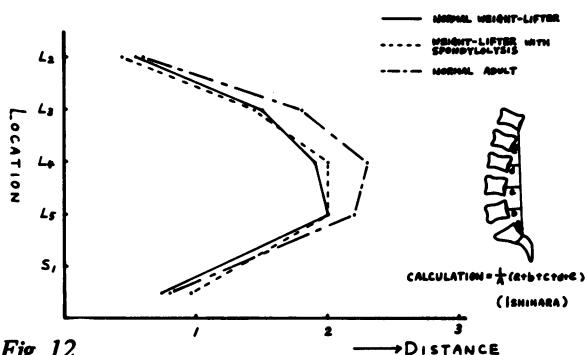


Fig. 12

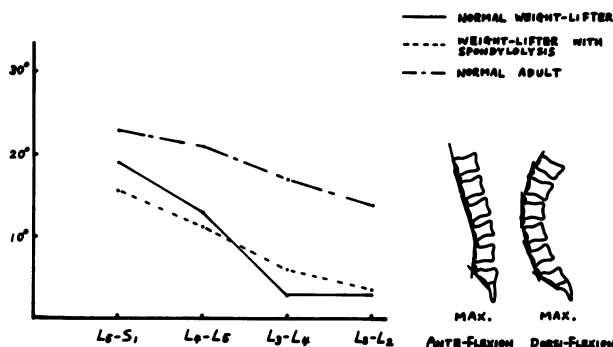
12. This shows the range of motion of the lumbar spine which is illustrated in the position of each vertebrae, according to the method of measurement — the angles between adjacent vertebral bodies on lateral roentgenograms are shown in degrees.

In normal adults there is more mobility than in weightlifters.

It might be said that the weightlifters with spondylolysis have minimum mobility of the lumbar spine, especially on the lowest disc space. (Fig. 13)

Fig. 13

**RANGE OF MOTION OF LUMBAR SPINE**



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### Summary

The lumbar spine was investigated on weightlifters who have been participating in lifting weights for several years, comparing the results with the normal adult.

8 cases of spondylolysis were found out of 26 weightlifters, which was a remarkably high incidence in comparison with normal adults.

Almost all of the investigated weightlifters had an episode of low back pain except in only 2 cases, and all of the spondylolytic weightlifters have been suffering from lumbago, of greater or lesser severity.

In spite of the lessened mobility of the lumbar spine in weightlifters with spondylolysis, abnormal movement was found at the site of the spondylolysis.

These findings mentioned above may suggest the overloading on the lower part of lumbar spine during the weightlifting training, and there may be some clue as to the aetiology of spondylolysis.

A number of fundamental problems remain still obscure.

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