

THE STUDYING OF SPINAL FIXATION IN LUMBOSACRAL SPONDYLOLISTHESIS
PATIENTS AT DAMASCUS HOSPITAL

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ABSTRACT

Introduction: Lumbosacral spondylolisthesis is one of the most common causes of low back pain. It is defined as the slippage of one vertebra above its neighboring vertebra, and this is accompanied by degenerative changes without accompanying deformities or defects in the vertebral annulus. Understanding the natural history of degenerative lumbar spondylolisthesis is important to design an individualized treatment plan for each patient. Conservative treatment may be considered for patients with low-level lumbar spondylolisthesis who present with nerve root stenosis or false gait contractures. These options may include physical therapy, corticosteroid injections, and epidural pain medications. If the case does not resolve, surgical options may include fixation therapy. **Aims:** To study the epidemiology of lumbar spondylolisthesis among patients attending Damascus Hospital. **Materials and Methods:** We conducted a retrospective study using a self-administered questionnaire based on patient records in Damascus Hospital. **Results:** The number of archives was 134 from 2013 to 2023.

KEYWORDS: Lumbosacral Spondylolisthesis, lower back pain, management, surgery, Damascus Hospital patients.

INTRODUCTION

The spine is an essential part of the structures that support the body and maintain its balance and proper movement, and it consists of a series of vertebrae.^[1] The spine also surrounds the spinal cord and protects it from injuries and traumas.^[3]

The characteristics of the thirty-three vertebrae vary depending on the part of the body in which they are located, as there are seven cervical, twelve thoracic, five lumbar, five sacral, and three coccygeal vertebrae.^[1] Spinal discs are located Between the vertebrae, and they act as a cushion to relieve the pressure and vibrations during movement.^[2]

Lumbosacral Spondylolisthesis refers to the condition of one of the vertebrae in the lower part of the spine being shifted forward compared to the vertebra below it, and may occur as a result of excessive stretching of the lumbar ligaments in the pelvis or due to weakness of one of the vertebrae.

Symptoms of Lumbosacral Spondylolisthesis include lower back pain^[7], Neurogenic claudication^[8,9,10], Radiating leg pain^[10], Radiculopathy^[10], Difficulty walking and imbalance^[11], Limited range of motion, Muscle Stiffness, Sleep disturbance^[10,12], Restless leg

syndrome^[12] and Numbness or tingling.

Types of Lumbosacral Spondylolisthesis include: Isthmic Spondylolisthesis, Degenerative Spondylolisthesis, Traumatic Spondylolisthesis, Pathological Spondylolisthesis, Congenital Spondylolisthesis and Post-surgical Spondylolisthesis.^[13,14]

The grades of Lumbosacral Spondylolisthesis are classified by the Meyerding classification, in which grades I and II are generally considered low-grade slip, while grades III, IV, and V are considered high-grade slip. Grade V is a complete slipping of more than 100%.^[19]

Management of Lumbosacral Spondylolisthesis includes conservative treatment (Physical therapy, Pain management and Activity modification)^[21] or surgical treatment.

Previous studies indicate that lumbosacral spondylolisthesis occurs more commonly in the lower lumbar vertebrae. A study published in the European Spine Journal in 2017 revealed that the prevalence of lumbosacral spondylolisthesis in the adult population ranges between 3 and 25%.^[24,25]

Practical study**Research aims**

An epidemiological study on the prevalence of lumbosacral spondylolisthesis in Syria, and the health status and improvement of patients after spinal stabilization for lumbar spondylolisthesis. Epidemiological study on the Gender, age and profession of patients. An epidemiological study of the results of medical tests and the radiological imaging methods used.

Research importance

Lumbosacral spondylolisthesis (LS) is a common disease, and the prevalence of LS varies between different countries according to gender, age, and profession.

Based on the importance of studying lumbosacral spondylolisthesis and its impact on the lifestyle and quality of life of patients and the role of lumbar stabilization in treating the condition and its effects, an epidemiological study was conducted on spondylolisthesis and lumbosacral stabilization.

Sample design

Object: A retrospective study aims to study the prevalence of spinal slip and lumbar stabilization in Syria.

Place of study: Damascus, Al-Mujtahid Hospital (Damascus hospital).

The Sample: A sample size of $n=134$ patients was collected from the patients visiting Al-Mujtahid Hospital with a complaint of spinal slip.

MATERIALS AND METHODS

Information was collected from patient files, recording the main complaint, demographic information related to the patients, results of laboratory tests for hemoglobin and electrolytes before and after surgery, imaging procedures and radiological diagnostic methods that were used, and the necessity of hospitalization and staying at the hospital.

Analytical study

The data was processed using the SPSS program, version 26, and a general descriptive study of the sample responses was conducted, followed by documenting the results of the study using appropriate previous studies and medical literature.

RESULTS**A) Demographically****Age**

A sample of 134 patients attending Al-Mujtahid Hospital was collected, and the average age in the sample was $50.56(\pm 10.69)$, the youngest being 15 years and the eldest being 72 years.

Table 1: Distribution of the sample by Age.	
Age	
Mean (standard deviation)	$50.65 \pm (10.69)$
Oldest age	15
Youngest age	72

Place of Admitting

60% of the sample were patients admitted to the specialized department, 4% of them were admitted to the ER.

Table 2: Distribution of the sample by place of admitting.	
place of admitting	
in the department	80 (60)
in the clinic	48 (36)
in the Emergency room (ER)	5 (4)

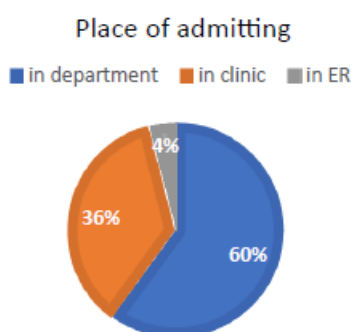


Figure 1: Patient characteristics by place of admission.

Gender

The vast majority of the sample were females, about 75%, while the percentage of males was 25%.

Table 3: Distribution of the sample by gender.

Gender	
Male	33 (25)
Female	100 (75)

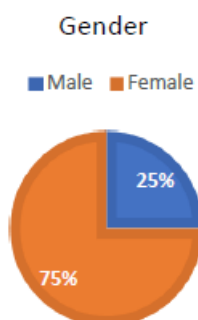


Figure 2: Distribution of the sample by gender.

Origins and Residence

The largest percentage of patients were from Damascus countryside governorate, about 31% of the sample, followed by 26% of the sample from Damascus governorate.

Table 4: Distribution of the sample by governorate.

Governorate	
Al-Hasakah	8 (6)
Al-Raqqah	11 (8)
Suwayda	3 (2)
Qamishli	5 (4)
Latakia	1 (1)
Aleppo	3 (2)
Hama	3 (2)
Homs	3 (2)
Daraa	17 (13)
Damascus	34 (26)
Deer Al Zoor	4 (3)
Damascus Countryside	41 (31)

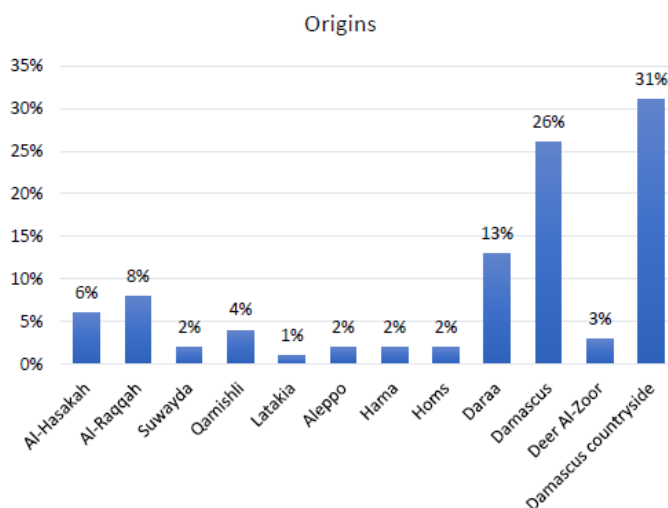
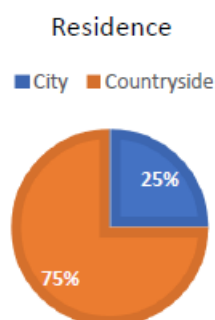


Figure 3: Distribution of the sample by Governorate.

Table 5: Distribution of the sample by Residence.

Residence	
countryside	100 (75)
city	33 (25)

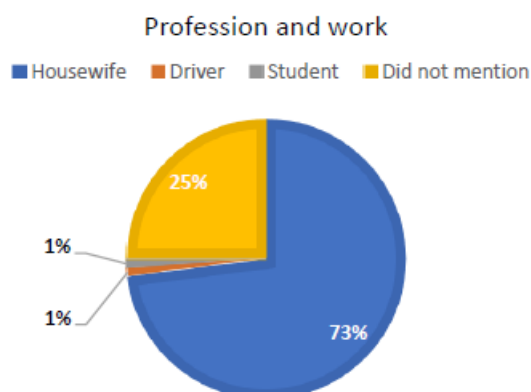
**Figure 4: Distribution of the sample by Residence.**

Profession and work

The vast majority of the sample are rural residents, at a rate of 75%. In terms of profession and work, almost all females recorded that they are housewives.

Table 6: Distribution of the sample by profession and work.

Profession and work	
housewife	98 (73)
driver	1 (1)
student	1 (1)
Did not mention	33 (25)

**Figure 5: Distribution of the sample by Profession and work.**

Family and medical history

The vast majority of the sample, about 99%, confirmed that they had no family or genetic history, and only 11% confirmed that they had a history of hospital admission.

Table 7: Distribution of the sample by family and hereditary diseases.

Family and hereditary diseases	
None	113 (99)
Diabetes in Parents	1 (1)

Table 8: Distribution of the sample by history of hospitalization.

Previous admission to a hospital	
No	106 (89)
Yes	13 (11)

Previous Admitting to a Hospital

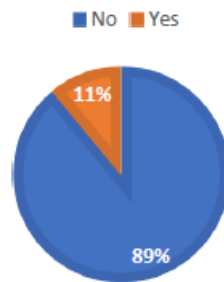


Figure 6: Distribution of the sample by Profession and work.

Smoking, Sheesha, Alcohol

The vast majority of the sample confirmed that they are non-smokers, accounting for 87% of the sample, and 1% of the sample are alcoholics.

Table 9: Distribution of the sample by Habits.	
Smoking	
Yes	17 (13)
No	116 (87)
Sheesha	
Yes	9 (7)
No	124 (93)
Alcohol	
Yes	1 (1)
No	132 (99)

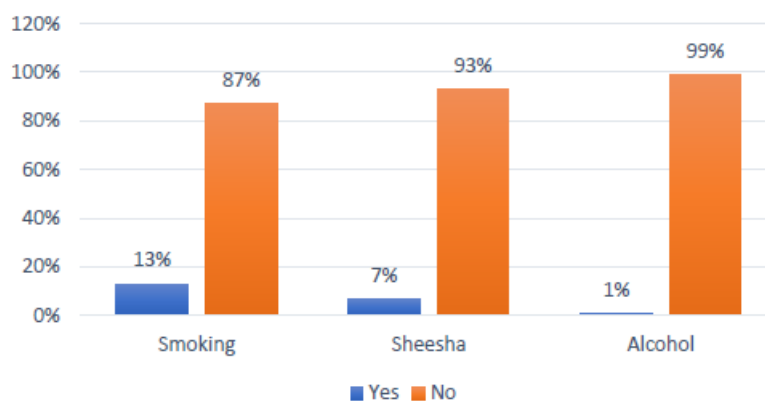


Figure 7: Distribution of the sample by habits.

B) Medical Aspect

Duration of hospitalization and diagnosis

The average duration of hospitalization was 12.36 months. Regarding the diagnosis, lumbosacral spondylolisthesis was diagnosed in the largest percentage of the sample, about 73% of the sample, and 13% had lumbar spondylolisthesis with herniation of the nucleus pulposus.

Table 10: Distribution of the sample by duration of hospitalization.	
hospitalization	(months)
Mean (standard deviation)	12.36 ± (7.22)
Shortest period	1
Longest period	40

Table 11: Distribution of the sample by diagnosis.

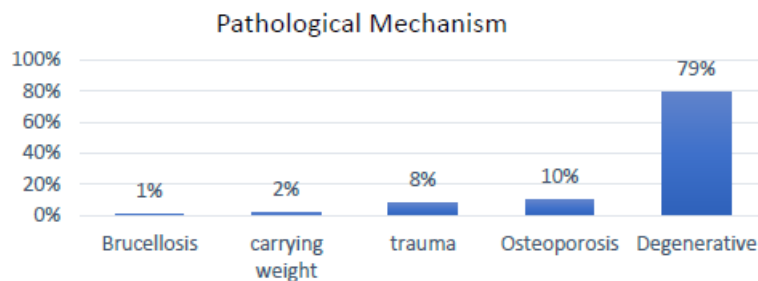
Diagnosis	
Lumbar spondylolisthesis	108 (78)
First degree lumbar spondylolisthesis with isthmus degeneration OK	1 (1)
Lumbar spondylolisthesis with herniation of the nucleus pulposus	15 (13)
Lumbar spondylolisthesis with stenosis	1 (1)
Lumbar spondylolisthesis with herniation of the nucleus pulposus and stenosis	5 (4)
Lumbar spondylolisthesis with first lumbar fracture	1 (1)
Lumbar spondylolisthesis with collapse fracture	1 (1)
horse's tail	1 (1)

Pathology

Regarding the pathological mechanism, the largest percentage of the sample, 79%, did not know the pathological mechanism, while 10% had osteoporosis, and 8% had a lumbar spine injury.

Table 12: Distribution of the sample by pathological mechanism.

Pathological mechanism	
Brucellosis	1 (1)
Carrying weight	2 (2)
Trauma	7 (8)
Osteoporosis	13 (10)
Degenerative	107 (79)

**Figure 8: Pathological mechanism in the patient of the sample.**

Location of the injury and Health status

Regarding the location of the injury, 98% of the patients had a lumbar injury, and regarding the health condition, 49% confirmed that they suffered from pain, and 27% of the sample suffered from neurogenic claudication.

Table 13: Distribution of the sample by location of injury.

Location of injury	
Lumbar	130 (98)
Sacral	1 (1)
More than one location	2 (1)

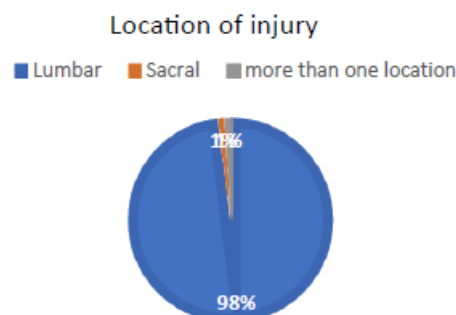
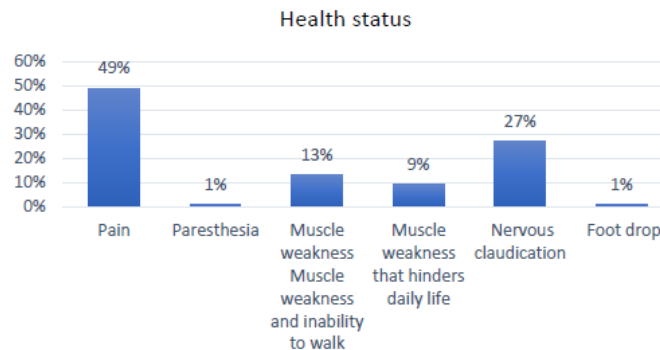
**Figure 9: Location of injury in patient of the sample.**

Table 14: Distribution of the sample by health status.

Health status	
pain	132 (49)
Paresthesia	3 (1)
Muscle weakness and inability to walk	34 (13)
Muscle weakness that hinders daily life	23 (9)
Nervous claudication	73 (27)
Foot drop	1 (1)

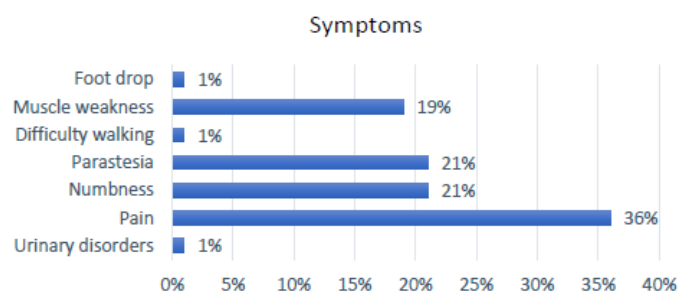
**Figure 10: Health status in the patients of sample.**

Symptoms

As for the symptoms that appeared, 36% suffered from pain, 21% suffered from numbness, 21% suffered from Paresthesia, and 19% suffered from muscle weakness.

Table 15: Distribution of the sample by symptoms.

Symptoms	
Urinary disorders	5 (1)
pain	130 (36)
Numbness	78 (21)
Paresthesia	78 (21)
Difficulty walking	1 (1)
Muscle weakness	69 (19)
Foot drop	2 (1)

**Figure 11: SymptomSsy innp tttohmes patients of sample.**

Risk factors and Red Signs

In terms of risk factors, 10% have osteoporosis, 7% have Bruises on the spine. In addition to the basic red signs in the medical examination, 64% had lower muscle weakness, and 21% had constant numbness.

Table 16: Distribution of the sample by Risk factors.

Risk factors	
Brucellosis	1 (1)
Bruises on the spine	9 (7)
Osteoporosis	13 (10)
none	110 (83)

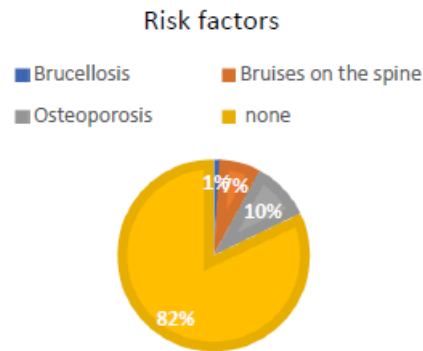


Figure 12: Risk factors in the patients of sample.

Table 17: Distribution of the sample by Red sings.	
Red sings	
pain	13 (8)
Constant numbness	34 (21)
Lower muscle weakness	101 (64)
Manifestations of cauda equina syndrome	7 (4)
none	2 (1)

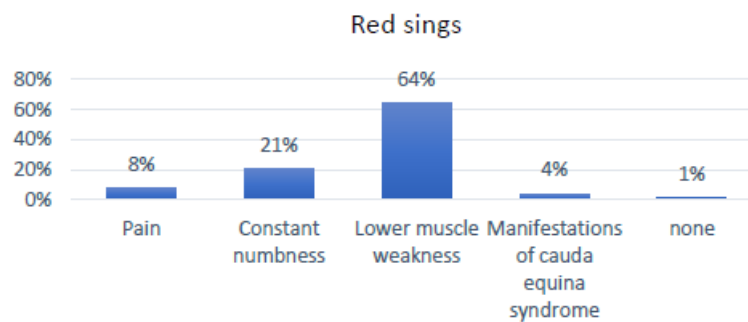


Figure 13: Red sings in diagnosis in the patients of sample.

Health status after Discharge

Upon discharge, 96% of the patients had no pain and symptoms improved with regular sphincter strengthening. Only 2% of the patients did not improve at all.

Table 18: Distribution of the sample by Health status after discharge.	
Health status after discharge	
Lumbar pain at the surgical site, resolution of radicular pain, improvement of symptoms, and control of sphincters	3 (2)
The pain disappears with improvement in symptoms, normal strength, and controlled sphincters	128 (96)
The patient did not improve	2 (2)

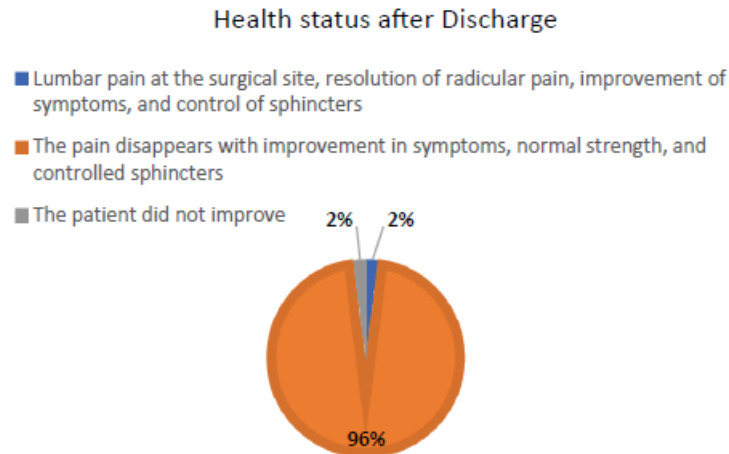


Figure 14: health status after discharge for patients.

C) Surgical Aspect

Complications of the surgery

Regarding the results of the surgical procedure, 94% of the patients underwent surgery without complications, 6% had complications, 3% of them had bleeding and blood transfusions, and regarding late complications, 95% had no complications.

Table 19: Distribution of the sample by surgical outcome.	
Surgical outcome	
Successful surgery without complications	125 (94)
Complications occur	8 (6)

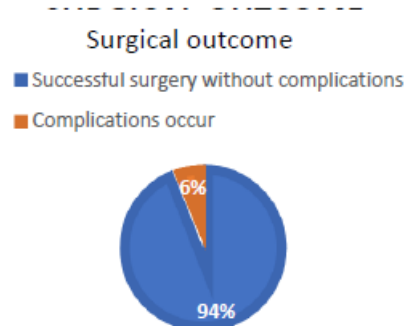


Figure 15: surgical outcomes for patients of sample none.

Table 20: Distribution of the sample by complications.	
Complications during and around surgery	
Bleeding and blood transfusion	4 (3)
none	129 (96)
Late surgical complications	
Wound infection and fixation device	3 (3)
Septic shock	1 (1)
The appearance of an abscess around the fixation device - drug renal failure	1 (1)
None	127 (95)

Complications during and around surgery

■ Bleeding and blood transfusion ■ none

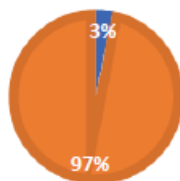


Figure 16: Complications during and around surgery.

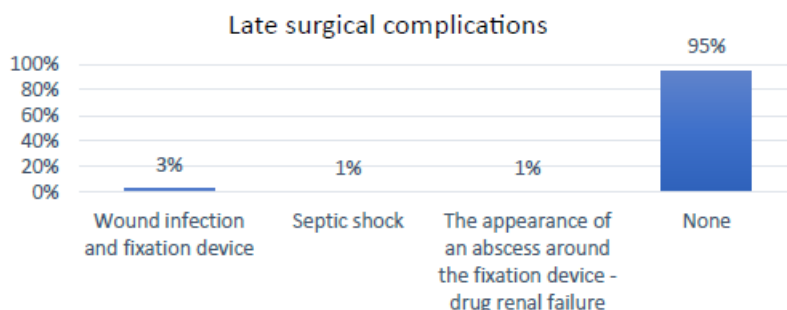


Figure 17: Late complications of the surgery.

Materials used in surgery

Regarding the materials used in surgery, 96% used screws and Rodini.

Table 21: Distribution of the sample by materials used in surgery.

Materials used in surgery	
Screws and Rodini	134 (100)

D) Laboratorial Aspect

Before surgery

Regarding the results of laboratory tests before surgery: 65% of patients had hemoglobin within normal, 69% had a normal count for red blood cells, while 14% had a decreased number of red blood cells, 74% had a normal number of white blood cells, and only 12% were higher than The normal limit, 80% have a normal platelet count, 46% have a PT higher than the normal limit, while only 5% have a PTT higher than the normal limit, and about 26% of the sample recorded an INR higher than the normal limit. In liver enzymes, 68% of the sample had normal Alt, 69% of the sample had normal AST, 90% of them had creatinine within the normal level, 89% of the sample had normal urea levels, 67% had normal blood sugar, while 24% had high blood sugar. Regarding electrolyte balance, 43% of the sample had normal calcium, 71% had normal potassium.

After Surgery

After the surgical procedure, the normal tests were repeated and it was noted that 62% of the sample had a decrease in hemoglobin below the normal limit, 21% of the sample had a decrease in their red blood cell level below the normal limit, 27% of the sample had a rise in white blood cell level above the normal limit, 6% of the sample had a Platelets lower than normal, about 11% of the sample's PT is higher than the normal limit, 5% of the sample had a PTT higher than the normal limit, with regard to the INR, 10% of the sample had a higher than normal rate, creatinine rose in 3%, urea rose above normal in 5% of the sample, and blood sugar rose in 10% of the sample after the surgical procedure. Regarding electrolyte balance, 22% of the sample remained within normal levels of calcium, 12% of the sample had a lower-than-normal level of potassium, and 3% of the sample had a decrease in their sodium level After surgery.

Table 22: Laboratory tests results before and after surgery.

	Before surgery	After Surgery
Hemoglobin		
Higher than the normal limit	2 (2)	1 (1)
Lower than the normal limit	33 (25)	82 (62)
Within the normal range	87 (65)	30 (23)
Not mentioned	11 (8)	20 (15)
Red blood cells		
Higher than the normal limit	1 (1)	-

Lower than the normal limit	19 (14)	1 (1)
Within the normal range	92 (69)	82 (62)
Not mentioned	21 (16)	30 (23)
White blood cells		
Higher than the normal limit	16 (12)	36 (27)
Lower than the normal limit	9 (7)	1 (1)
Within the normal range	98 (74)	23 (17)
Not mentioned	10 (8)	73 (55)
Platelets		
Lower than the normal limit	7 (6)	8 (6)
Within the normal range	107 (80)	46 (35)
Not mentioned	19 (14)	79 (59)
PT		
Higher than the normal limit	61 (46)	14 (11)
Lower than the normal limit	1 (1)	1 (1)
Within the normal range	47 (35)	15 (11)
Not mentioned	24 (18)	103 (77)
PTT		
Higher than the normal limit	6 (5)	6 (5)
Lower than the normal limit	2 (2)	-
Within the normal range	36 (27)	12 (9)
Not mentioned	89 (67)	115 (86)
INR		
Higher than the normal limit	35 (26)	13 (10)
Within the normal range	72 (54)	19 (14)
Not mentioned	26 (20)	101 (76)
ALT		
Higher than the normal limit	4 (3)	2 (2)
Within the normal range	91 (68)	23 (17)
Not mentioned	38 (29)	108 (81)
AST		
Higher than the normal limit	3 (2)	2 (2)
Within the normal range	92 (69)	23 (17)
Not mentioned	38 (29)	108 (81)
Creatinine		
Higher than the normal limit	1 (1)	4 (3)
Lower than the normal limit	1 (1)	1 (1)
Within the normal range	120 (90)	37 (28)
Not mentioned	11 (8)	91 (68)
Urea		
Higher than the normal limit	4 (3)	6 (5)
Within the normal range	118 (89)	35 (26)
Not mentioned	11 (8)	92 (69)
Glucose		
Higher than the normal limit	32 (24)	13 (10)
Lower than the normal limit	-	1 (1)
Within the normal range	89 (67)	32 (24)
Not mentioned	12 (9)	87 (65)
Calcium		
Higher than the normal limit	1 (1)	-
Within the normal range	57 (43)	29 (22)
Not mentioned	75 (56)	104 (78)
Potassium		
Higher than the normal limit	8 (6)	3 (3)
Lower than the normal limit	10 (8)	16 (12)
Within the normal range	95 (71)	39 (29)
Not mentioned	20 (15)	75 (56)
Sodium		

Higher than the normal limit	2 (2)	-
Lower than the normal limit	8 (6)	4 (3)
Within the normal range	102 (77)	54 (41)
Not mentioned	21 (16)	75 (56)

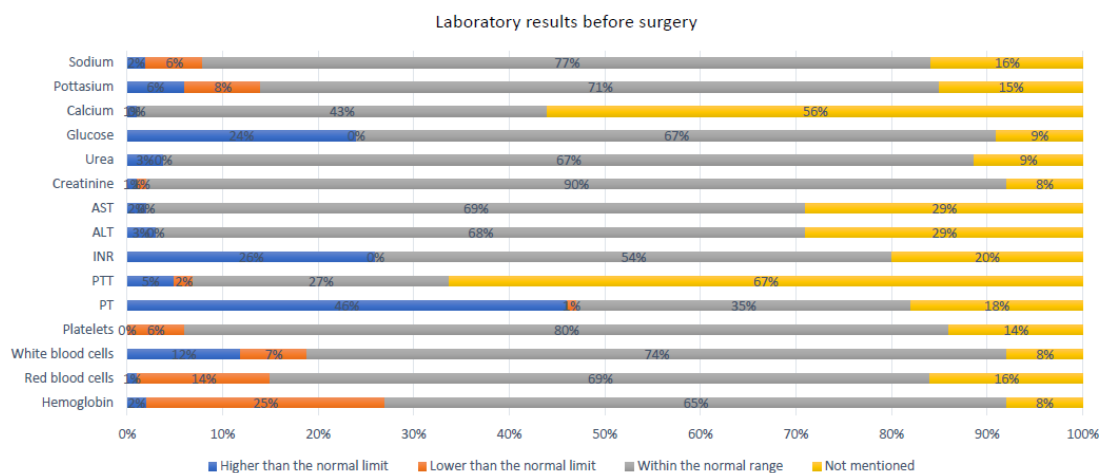


Figure 18: Laboratory results before surgery.

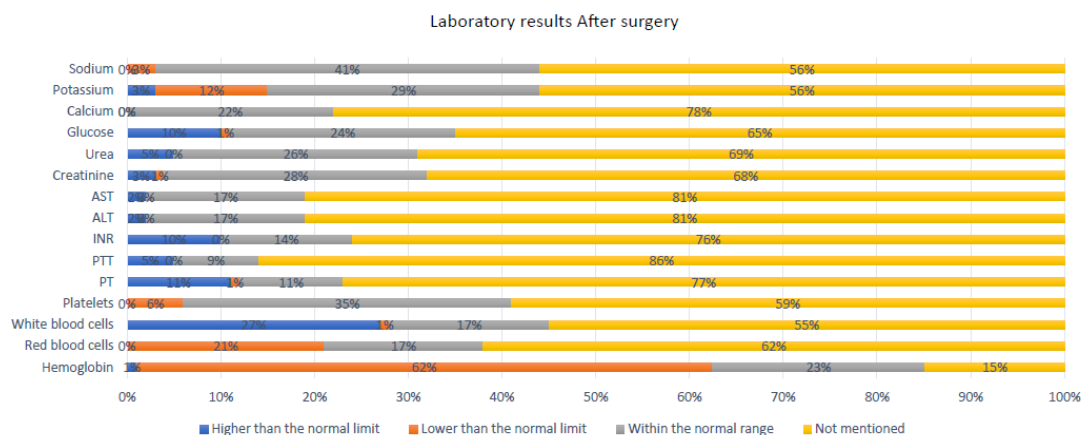


Figure 19: Laboratory results After surgery.

E) Imaging

The vast majority of the sample, about 94% of the sample, had an MRI performed, while only 8% had a CT scan, and 24% of the sample had a simple x-ray.

Table 23: Distribution of sample by doing radiographic investigations.		
Radiographic investigations	yes	no
Axial CT scan	11 (8)	122 (92)
MRI	125 (94)	8 (6)
Simple X-ray	32 (24)	101 (76)

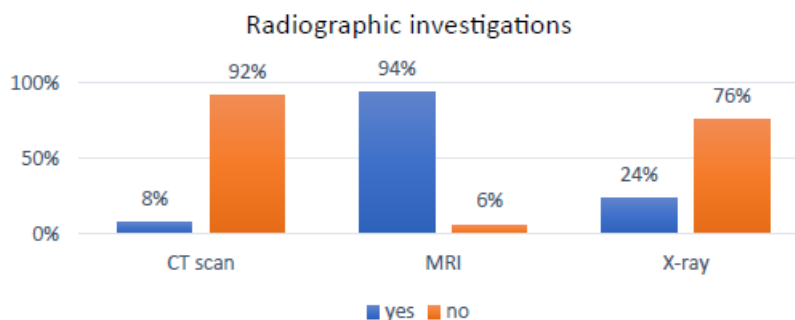


Figure 20: Radiographic investigations used in diagnosing.

F) Hospitalization

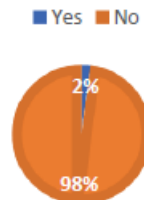
Regarding hospital stay, only 2% (about 3 patients) of the sample needed to stay in ICU, one patient needed to stay for one day, and two patients needed to stay for two

days, as they were carefully monitored within the sample, and the reason for entering the hospital was due to complications from the surgical procedure.

Table 24: Distribution of the sample by the need to stay at ICU.

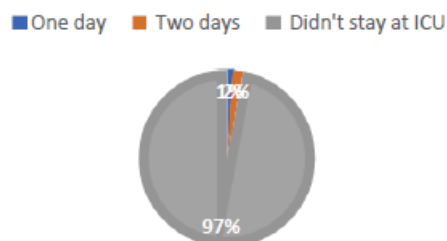
Is there a need to stay at ICU?	
Yes	3 (2)
no	130 (98)

Is there a need to stay at ICU?

**Figure 21: The need to stay at ICU.****Table 25: Distribution of the sample by Duration of staying at ICU.**

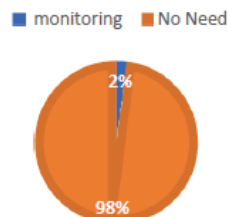
Duration of staying at ICU	
One day	1 (1)
Two days	2 (2)
Didn't stay at ICU	130 (98)

Duration of staying at ICU

**Figure 22: The duration of staying in ICU.****Table 26: Distribution of the sample by Actions taken in ICU.**

Actions taken in ICU	
monitoring	3 (2)
Didn't stay at ICU	130 (98)

Actions taken in ICU

**Figure 23: Actions taken in ICU.****Table 27: Distribution of the sample by Reason for entering ICU.**

Reason for entering care	
Due to complications of surgery	3 (2)
Didn't need to stay at ICU	130 (98)

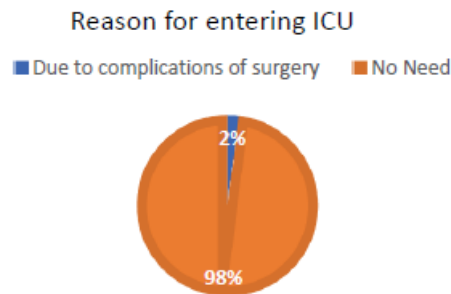


Figure 24: Reasons for entering ICU.

DISCUSSION

In discussing studies corresponding to the epidemiological study that was conducted at Al-Mujtahid Hospital to study spinal stabilization of lumbar spondylolisthesis, an epidemiological study was conducted (He et al., 2021).

On a sample size of 4548 people in a Beijing community^[31] aged 50 to 64 years from local communities, of the 4548 people included in the study, 2490 (54.75%) were male and 2058 (45.25%) were female.

The Data was collected through advertisements placed in residential areas and community centers for people to participate in the study between the years 2013 to 2014.

Lateral CT images were read for all sample participants, and then observation and evaluation of the vertebrae from the L1 to L5 was performed.

The results of this study indicated that the total prevalence of LS in middle age in Beijing society was 17.26%, 15.98% in males and 18.80% in females, and women are more likely to suffer from LS after the age of 60 years.

This is consistent with the epidemiological study we conducted, which indicated that 75% of patients were female.

A consent study conducted in Massachusetts (Kalichman et al., 2009)^[32] showed that the prevalence of LS was 21.3% for females and 7.7% for males (84 females and 104 males, mean age: 52.66 years).

Another study in the United States (Denard et al., 2010)^[33] showed that the prevalence of LS was 31% among males (5995 subjects, mean age: 74 years), and the prevalence was related to age, sex, and other factors; It is more common among the elderly and females.

Some researchers have found that the prevalence of LS is related to profession such as history of driving and working in the agricultural/fishing industry.

Recommendations

About diagnosing lumbar spondylolisthesis:

1. The patient must undergo a complete clinical examination and questioning about all medical, clinical and surgical antecedents.
2. Adopting radiological diagnostic methods such as magnetic resonance imaging (MRI) to determine the location and size of the slip.
3. Usage of additional medical radiological diagnostic methods such as CT and X-rays.

The importance of spinal stabilization for lumbar spondylolisthesis:

1. Fixation treatment helps improve the stability of the affected vertebrae and reduce patients' pain.
2. Immobilization contributes to avoiding serious complications such as pressure on nerve roots.
3. Immobilization improves patients' quality of life and increases the chances of regaining better function.
4. Continued follow-up with the specialist doctor and regular review

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