Employment Outcomes Following Thoracolumbar Fractures: Long Term Follow Up Greater Than 5 Years

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Abstract

Study design
Retrospective cohort study with a prospective follow up via questionnaire.

Objectives
To identify patients >5-year outcomes following a traumatic thoracolumbar fracture.

Methods
240 patients were identified from Cardiff and Vale database with a traumatic thoracolumbar fracture between and including the dates of 01/01/2013 and the 31/01/2017. 123 questionnaires were sent out via post and a follow up phone call was done. Retrospective data was gathered about employment status before their fracture and >5 years following the event. These outcomes were compared to their demographics and characteristics of their injury and treatment.

Results
The total replies received was 27 with 23 (85%) opting in and 4 (15%) opting out. The average age of the cohort was 38 (SD=10.4) with a range of 18-52. There was no significant difference between patients treated conservatively or surgically with regards to the patient's demographics or characteristics of their injuries. Looking at employment outcomes there was no differences employment rates in the treatment groups (P=0.324) or the hours worked before and after their injuries (P=0.814). Of the previously employed patients 61% returned to the same job with only 27% of these reducing their hours. The patients that did not return to the same job all kept the same skill level jobs. None of patient's demographics or injury characteristics showed any correlation with returning to work such as sex (P=0.270), single level fractures against polytrauma and multilevel fractures (P=0.143) or when comparing RTCs against falls (P=0.184).

Conclusion
This study suggests there is no negative employment outcomes 5 years following a traumatic thoracolumbar fracture. Patients who are surgically treated vs conservatively also have very similar outcomes. However, this sample size is small, and more data is needed to make this data clinically significant. The next steps are to gather more data to reach this conclusion.

Introduction

Traumatic thoracolumbar fractures are found in around 4-5% of blunt trauma incidents and can lead to pain, neurological deficit, functional disability, and difficulty with employment (1). Current literature looks at employment outcomes compared to socioeconomic status, neurological deficit, pain with a <1 year follow up (2-6). These studies show that employment is impacted negatively in the short term for these patients. However, there is currently little understanding of the longer-term employment outcomes in these patients. This study aims to look at patient's long term employment outcomes compared to their demographics and injury features.

Methods

Inclusion/ Exclusion

Using the Cardiff and Vale hospital database CT and/or MRI spinal reports were collated that had been requested through the A&E and orthopaedic departments between and including the 01/01/2013 and the 31/01/2017. These reports included key word "fracture', "dislocation" and/or "cord injury". This gave us a minimum follow up of 5 years to look at long term outcomes of these patients. From these, 24,110 reports were identified. Patients aged 18-65 years at the time of their injury that had had traumatic thoracolumbar fractures were included. Pathological, A0, solitary cervical and sacral fractures were excluded (**Table 1**). After inclusion and exclusion 254 patients were identified that fulfilled our criteria for inclusion. Of these patients the hospital and GP database was checked to confirm their survival. It was found that 14 (6%) patients were deceased which left a final inclusion list of 240 patients.

Table 1. Inclusion and Exclusion Criteria

Inclusion Criteria	Exclusion Criteria
• Treated within Cardiff and Vale • Acute or traumatic fracture/s and/or dislocation/s of the thoracolumbar spine • Aged 18-50 years at time of injury (with a "normal" employment age including a 5 year follow up) • Conservative and Surgical intervention	• Osteoporotic / insufficiency / stress fractures, infection, pathological fractures • A0 fractures (AO classification) • Cervical fractures without thoracolumbar involvement • Sacral fractures without thoracolumbar involvement

Outcomes Measured

Once patients had been identified a questionnaire was sent out via the post with the option of filling out an online version. A reminder phone call was carried out 1 week after the initial postal questionnaire with option of answering a shortened version over the phone. The questionnaire included information regarding; current and prior employment, surgical and conservative treatment, prior and current pain, prior and current neurology, AO Spine Patient-Reported Outcome Spine Trauma (PROST) questionnaire, and satisfaction with their care (**Table 2**). The AO PROST questionnaire was chosen as an accurate resource for looking at patients' functional outcomes following a spinal fracture (7-8). Once data had been received the patient's jobs were classified using the International Standard Classification of Occupations version 08 (ISCO-08) and allocated a skill level (9) (**Table 3**). It was then analysed using Excel version 16.54. For this study I looked at patient's demographics and injury features compared to their employment outcomes. I also compared these outcomes with conservative and surgically groups.

Table 2. Data Gathered

	Time of injury	Post-Injury > 5 years
Demographics	Age	-
	Sex	-
	Spinal Level/s Injured	-
	Mechanism of Injury	-
Employment	Employment status	Employment status
	Job type	Job type
	Hours worked per week	Hours worked per week
Treatment	Surgical or conservative treatment	-
	Therapies/management received	-
Physical Signs	Pre-existing pain	Persisting pain since injury
	Pre-existing motor weakness	Persisting motor weakness since injury
Satisfaction	-	Satisfaction of overall treatment
Questionnaires	-	AO Spinal PROST

Data gathered via questionnaire form before >5 years post injury

Table 3. ISCO-08 classification of occupations

Broad skill level	Classification
Skill levels 3 and 4	1. Managers 2. Professionals 3. Technicians and associate professionals
Skill level 2	4. Clerical support workers 5. Service and sales workers 6. Skilled agricultural, forestry and fishery workers 7. Craft and related trades workers 8. Plant and machine operators, and assemblers
Skill level 1	9. Elementary occupations
Armed forces	0. Armed forces occupations
Not elsewhere classified	X. Not elsewhere classified

Results

123 questionnaires were sent at the time of this write up. 27 replies were received with 23 (85%) filling out the questionnaire and 4 (15%) choosing to opt out of the study. Of the data received 20 (87%) were sent back via post, 2 (9%) being returned via a shortened phone call questionnaire and 1 (4%) being filled out online. The average time for return of this data was 9 days (SD=4.0).

Demographics

Baseline demographics of the patients that replied to the questionnaire are shown on **table 4**. The total number of patients was 23 with 8 (35%) having been treated conservatively and 15 (65%) being treated with surgical intervention. The mean age of these patients was 38 (SD = 10.4) with a range of 18-52 at the time of their injury. There were more males than females, but the sex of the patients did not differ between the two treatment groups (P=0.105).

The most common mechanisms of injury were road traffic collisions (RTC) (35%) and falls (35%). 6 (26%) mechanisms of injury being unknown after looking through patients notes. Patients who had been involved in an RTC were more likely to be treated using surgical management (75%) compared to falls patients (50%) although there was not a significant difference between these groups (P=0.245).

There was a total of 34 thoracolumbar fractures in the included group with more patients having sustained a single level fracture injury (65%) than a multi-level fracture injury (35%). There was no difference in level of fractures between the surgical and conservative groups (P=0.195) although more patients surgically treated had sustained a single level fracture (73%). The most common fracture level was L1 with 9 fractures identified. T12 was the second most common level to be injured with 5 fractures identified. This was the same across the conservative and surgical groups also. T11-L2 was identified as having the highest incidence of fractures in the total population (53%) which was the same as the operative group (65%). There were however more fractures identified above the level of T11 than below T11 (57%) in the conservative group.

Table 4. Baseline Demographic of included patients

Demographic	Total replied (N=23)	Conservative group (N=8)	Surgical group (N=15)	P
Clinical characteristic				
Age at Injury (SD) (y)	38 (10.4)	37 (11.8)	37 (11.2)	0.011
Male Sex [n (%)]	15 (65)	7 (88)	8 (53)	0.105
Female Sex [n (%)]	8 (35)	1 (12)	7 (47)	
Mechanism of Injury [n (%)]				
Road Traffic Collision	8 (35)	2 (25)	6 (40)	0.245
Fall	8 (35)	4 (50)	4 (27)	
Other	1(4)	20 (0)	1 (6)	
Unknown	6 (26)	2 (25)	4 (27)	
Employment, [n (%)]				
Employed prior	18 (78)	7 (88)	11 (73)	0.324
Unemployed prior	5 (22)	1 (12)	4 (27)	
Single and multi-level [n (%)]				
Single level fractures	15 (65)	4 (50)	11 (73)	0.195
Multi-level fractures >1	8 (35)	4 (50)	4 (27)	
Total Fractures	N=34	N=14	N=20	
Level of fracture [n (%)]				
Above T11	13 (38)	8 (57)	5 (25)	
T11 – L2	18 (53)	5 (36)	13 (65)	
Below L2	3 (9)	1 (7)	2 (10)	

Baseline clinical and radiologic characteristics in surgical and nonsurgical groups

Employment Outcomes

There was no significance difference when comparing the surgical and conservatively treated patients with regards to employment status (table 4) (P=0.324) and hours worked (table 6) (P=0.814) prior to their injury (**Table 5**). Of the 23 patients 18 (78%) were employed prior to their injury and 5 (22%) were unemployed (table 4). 3 of these previously unemployed patients were students and 2 had other comorbidities resulting in them not being able to work such as "diabetic illness". 17 (74%) individuals are currently employed, and 6 (26%) are currently unemployed with 4 (17%) of these having been employed previously (**Table 5**). 3 out of 4 of these patients described the reason for not returning to work due to "pain" and the other due to a "spinal cord injury" and it being "physically impossible" to do so. The average hours worked by employed individuals went from 40 (SD) hours to 38 (SD) hours a week. There was no significant difference between employment status (P=0.255) and hours worked (P=0.906) before and after their injuries (**Table 5**).

Table 5: Summary of patient employment outcomes

	Prior to injury (N=23)	Post injury (N=23)	P Value
Employed [n (%)]	18 (78)	17 (74)	0.255
Unemployed [n (%)]	5 (22)	6 (26)	
Average hours worked (SD) (hr)	40 (7.7)	38 (8.0)	0.906

Comparison between total patients employed and unemployed before and >5 years after their injury

Table 6 compares outcomes of previously employed patients that were conservatively and operatively treated. Of the 18 patients employed prior to their injury 11 (61%) returned to the same job. Of these 11 patients, 3 (27%) reduced their hours, 6 (55%) kept the same hours and 2 (18%) increased their hours. 7 (39%) patients did not return to the same job with 4 (57%) of these individuals being currently unemployed. Of the individuals employed that did not return to the same job 1 (14%) patient had reduced their hours and 3 (43%) had either kept the same or increased their hours. There was found to be no significant difference between the operative or conservatively treated patients when comparing hours worked before and after injury (P=0.363) and returning to the same job (P=0.305). The most common answer given for not returning to the same job that the work was "too physical" or that they were "physically unable".

Table 6. Operative and conservative employment outcomes

	Total (N=18)	Operative (N=11)	Conservative (N=7)	P value
Returned to same job [n (%)]	11 (61)	6 (55)	5 (71)	0.305
Didn't return to same job [n (%)]	7 (39)	5 (45)	2 (29)	
Hours reduced [n (%)]	7 (39)	4 (36)	3 (43)	0.363
Hours same or increased [n (%)]	11 (61)	7 (64)	4 (57)	
Mean hours worked prior to Injury (SD) (hr)	40 (7.7)	39 (11.6)	41 (4.3)	0.814
Mean hours worked after Injury (SD) (hr)	38 (8.0)	39 (6.8)	37 (8.7)	0.563

Comparison between conservative and surgical management outcomes of previously employed patients

Those individuals that changed jobs did not change skill levels denoted by the ICSO classification (**Table 3**). The most common job type in this group prior to injury was 'professionals' with 'sales and services' being the second most common. Post injury the largest group was found to be the 'professional' group with the 'unemployed' group following it. This however does not consider the fact there are 2 individuals unemployed previously who did not return to work and 3 students prior to their injury that went into employment after their injury.

Table 7 compares the demographics of individuals that were employed prior to their injury with if they returned to work or not. Comparison between sex, levels of fracture and mechanism of injury was done. There was no significant correlation between sex (P=0.270), single level fractures against polytrauma and multilevel fractures (P=0.143) or when comparing RTCs against falls (P=0.184).

Table 7. Patient characteristics against their employment outcomes

	Total (N=18)	Returned to work (N=11)	Didn't return to work (N=7)	P Value
Sex [n (%)]				
Male	13 (72)	7 (64)	6 (86)	0.270
Female	5 (28)	4 (36)	1 (14)	
Type of Injury [n (%)]				
Single level fractures	9 (50)	7 (64)	2 (29)	0.143
Multilevel fractures	6 (33)	3 (27)	3 (42)	
Polytrauma	3 (17)	1 (9)	2 (29)	
Mechanism of Injury [n (%)]				
Road Traffic Collision	6 (33)	2 (18)	4 (57)	0.184
Fall	7 (39)	5 (46)	2 (29)	
Other	0 (0)	0 (0)	0 (0)	
Unknown	5 (28)	4 (36)	1 (14)	

Comparison between patient demographics and injury characteristics against if they returned to work

Discussion

The main comparison in this research was to assess the long-term employment outcomes following a traumatic thoracolumbar fracture. Based on analysis of the literature there is little research into the long-term employment outcomes > 5 years after a traumatic thoracolumbar fracture. Marek et al looked at long term outcomes of traumatic thoracolumbar fractures and suggested that these patients can return to a good quality of life in the long term (10). The study suggested there was no significant difference between employment outcomes and demographics of the patient, the injury type, and neurological signs. Our study does show the same trends however both studies include a small sample size and Marek et al concentrates mainly on mental and functional outcomes of these patients therefore more data is needed.

Burham et al showed that there was a significant reduction in returning to work 1year post thoracolumbar injury with many individuals working less hours (11). This study shows us a glimpse into the short-term recovery of patients that may still be taking a longer sick leave or in the middle of a phased return to work. Our study however shows that when looking at employment rates 5 years on there is no significant difference in returning to work. We also compared patient demographics with returning to work and found that there was no correlation with sex, level of fracture or mechanism of injury. Our data set did however include 3 patients that were previously unemployed due to being in education. These individuals did all go into employment in the follow up potentially skewing the data slightly when looking at the number of employed individuals before and after injury. With a bigger cohort of patients this will hopefully not affect the data significantly and we can consider excluding these patients for certain analysis.

Tropiano et al looked at the short-term outcomes 8 months following thoracolumbar fractures that had been treated surgically with reduction and casting and suggested a 13% reduction in employment (12). Again, this study only gives us a look into patient employment during early recovery. When we compared the differences between employment outcomes of conservative and surgically treated individuals our study showed that there were no significant differences in returning to work or hours worked.

We looked at types of jobs individuals had using the ISCO-08 classification before and after their injury. This found that individuals that did not return to the same job and that were still employed stayed in jobs with the same skill level. This however does not consider the physicality of the jobs. Some patients described being unable to return to their original job due to pain while others changed careers due to personal choice. It is difficult to understand if these career changes have negatively impacted patients or if they are happy in the job they have had to change to due to their fracture.

The data from this study was gathered from a single reliable database from a single hospital site. All patients were treated at the same hospital and had treatment from the same department. This study is one of the first to look at long term employment and satisfaction outcomes as well as comparing functional outcomes with this. Although this study has shown that there are no significant differences when it comes to employment outcomes long term, the data discussed here is only a small sample of the included patient cohort. More data is needed to make these comparisons statistically significant.

Conclusion

This study shows that in patients who have sustained traumatic thoracolumbar fractures there is no significant differences between their pre-injury employment status and their employment status >5 years following said injury. There is no correlation between any demographics and surgical/conservatively treated patients have similar outcomes. This data set is however small, and a larger cohort of patients is needed to confirm this conclusion. The next stages of this study will be to send the remaining questionnaires out and analyse the data that comes back comparing pain, neurological outcomes, and satisfaction with employment.

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