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Original Article

The Tetrafigap Survey on the long-term outcome of tetraplegic spinal cord injured persons: Part III. Medical complications and associated factors

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Study design: To study the short- and long-term medical complications encountered in tetraplegic spinal cord injured persons (TSCI) and to give prominence to both the medical and socio-economic factors with which they are respectively associated.

Methods: The Tetrafigap Study is a multicentre epidemiological survey carried out using self-administered questionniares studying the global long-term outcome of TSCI patients after the initial phase of rehabilitation.

Results: The data for 1668 patients were analyzed. The rate of rehospitalisations was 74.4% with on average three stays per patient and as reported causes, in descending order: urinary complications, systematic follow-up, pressure sores, respiratory complications, contractures, bowel complications, pains and secondary fractures of the lower limbs. At the time of the survey, 84.7% of patients mentioned awkward contractures, 73.8% pains, 55.9% embarrassing urinary leakage and 14.1% pressure sores. With regard to persons suffering from complete motor lesion, urinary complications and pressure sores were more frequently reported, whereas for persons suffering from incomplete motor lesions, awkward contractures and pains were more frequent. In the elderly, pains were more often mentioned, and pressure sores and pain were also the most common in patients coming from lower socio-professional status. Contractures and pain decreased with time. All these complications but pressure sores and pain are statistically interrelated.

Conclusion: The medical complications of spinal cord injured persons are frequent, they are linked to biological, psychological and environmental factors, and are interrelated. Therefore, seeking mid- and long-term risk factors must be given priority in order to better adapt attempts at increasing secondary prevention.

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Keywords: tetraplegia; spinal cord injury; long-term outcome; complications; pressure sore; pain; urinary complications

Introduction

Thanks to advances in emergency medicine and intensive care techniques, the survival rate of spinal cord injured persons (SCI) has considerably improved.[1–3] Similarly, improved knowledge in physical medicine and rehabilitation and the setting up of centres specialising in SCI patients has allowed a significant increase in life expectancy among them, with a large number of patients back home.[4]

These persons thus constitute a growing and ageing population, whose specificity, particularly with regard to medical aspects is not well known in the mid- and long-term.

Most of the major studies conducted on this subject do not differentiate paraplegic and tetraplegic persons,[5–18] and when they do so, they mainly deal with short-term outcome.[19]

As time goes by, the major risk is the occurrence of secondary complications, often causes of morbidity and death, leading to an increase in the number of rehospitalisations, an increase in direct and indirect

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[4]See Appendix

costs and a general worsening in the person's quality of life.[15,20]

It is, therefore, particularly relevant to study and follow-up these persons in the long term. In France, the Tetrafigap survey serves this need as it examines the prevalence of medical complications in tetraplegic spinal cord injured persons (TSCI) reported in the long term, makes a comparative analysis of the various complications and the clinical and environmental factors with which they are respectively associated.

Methods

The Tetrafigap survey was developed under the aegis of the 'International French-speaking association of paraplegic therapy groups'. It is a multi-centre epidemiological survey; its protocol and methodology are described in detail in part I.[21]

The survey included persons with complete or incomplete TSCI, aged 16 years or over at the time of injury, 18 years or over at the time of the survey, and with a minimum 2-year delay. Their injury had resulted in an admission to one of the rehabilitation units which had agreed to take part in the project (35 departments or centres).

Each patient, who had given his/her informed consent to take part in the survey, received a questionnaire to fill in, based on the long-term outcome, dealing with several themes and particularly with a medical section.

The socio-demographic characteristics of the study population and the causes of initial injury were described in Part II.[22]

The survey population involved 1668 patients. Their characteristics are summarised in Table 1.

The complications leading to rehospitalisation following discharge were registered as cumulative incidence:

- Have you been rehospitalised since the end of re-education? (yes/no)
- If you have been rehospitalised:
  - How many times?
  - How long in total (in months)?
- What were the causes: systematic assessment, pressure sore(s), urinary complications, respiratory complications, bowel complications, pains, osteoma(s), awkward contractures, non-surgical upper limb fractures, surgical upper limb fractures, non-surgical lower limb fractures, surgical lower limb fractures, other causes to be specified
- Did some complications occur during those rehospitalisations, if so, please describe them?

The items relative to complications present during the survey were registered as prevalence data:

- Have you had one or more pressure sores (presently)? (yes/no)
- Have you had any awkward urinary leakages? (never/sometimes/often)
- Have you had any awkward contractures? (never/sometimes/often)
- Have you had any embarrassing bowel leakages? (never/sometimes/often)
- Have you had any perspiration attacks? (never/sometimes/often)
- Have you had any other complications? (never/sometimes/often)
- If so, please describe them?
- Have you had any pains? (never/sometimes/often)
- If so, please indicate the intensity (between 0 and 10, 0 being no pain and 10 being the most awful pain)?

Table 1 Characteristics of the Tetrafigap survey population: demographic variables and type of injury

	Mean ± *SD*	
Age at accident*	30.7 ± 13.2	
Age at survey*	43.6 ± 13.5	
Time since injury*	12.9 ± 7.9	
	n	%
Gender		
Females	334	20
Males	1333	80
Level of lesion		
C1–C2	110	7.2
C3	276	18.2
C4	442	29.1
C5	406	26.7
C6	257	16.9
C7–C8	30	1.9
Motor lesions		
Complete	841	53.3
Incomplete	738	46.7
Sensory lesions		
Complete	595	37.4
Non-complete	994	62.6

*in years

The statistical analysis was carried out with parametric (analysis of variance) and non-parametric tests (Mann-Whitney, Kruskall-Wallis tests and Pearson's χ^2 independence test), with univariate correlations. The threshold of significance taken into account was $P = 0.05$.

Results

Complications leading to rehospitalisation following discharge

Mean time elapsed since the accident is 12.9 years (median 11.2 years with extreme from 2 to 40, Figure 1). During this period, the reported rate of rehospitalisation was 74.4%, with a median number of three per patient and a bimodal distribution, 85% of patients were rehospitalised less than six times, 10% 10 times or more and only 5% between seven and nine times

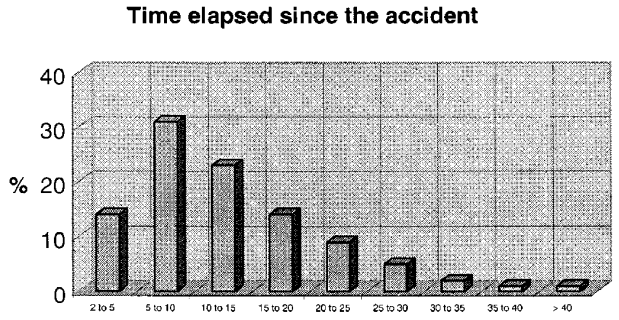

Figure 1 Time following discharge (in years)

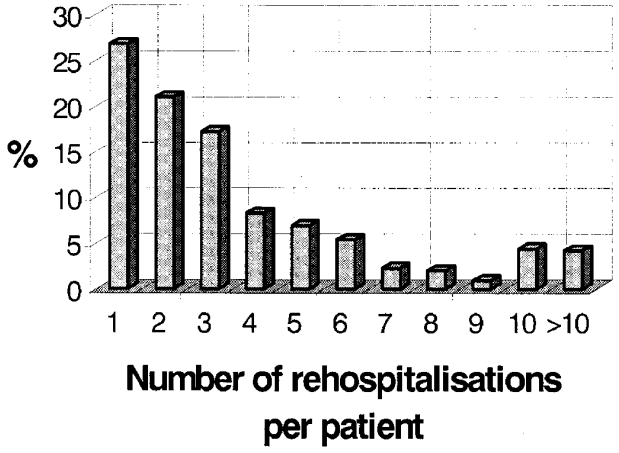

Figure 2 Distribution of the survey population according to number of rehospitalizations since the discharge from the first rehabilitation unit

(Figure 2). As expected with such cumulative incidence data, the number of rehospitalisation increased with length of time after the accident ($P=0.001$) but the two figures do not have the same distribution.

The mean cumulated length of stay was 6.1 months, but the median was only 2 months. The causes of rehospitalisation are shown in Table 2. Urinary complications were the most common reported causes (32.1%), then systematic follow-up (27.7%) and pressure sores (19.7%). The open item 'other causes' was filled in by 14.4% of patients to describe rehospitalisation regarding functional surgery of the upper limbs (35.5%), urological or genital surgery (23%), and other surgical procedures (66%). These were common answers but were not exclusive, as the same patient could report several of these complications.

Further complications arose or were discovered during 15% of these rehospitalisations, first of all infections (35%) then skin complications (26.2%).

Complications present at the time of the survey

Three types of complications were reported by over half the persons: awkward contractures (84.7%), pain (73.8%, of which 36% reported severe pain higher than seven out of 10 on an analogic visual scale), and lastly, embarrassing urinary leakage (55.9%). Other reported complications were perspiration attacks (33.7% with 11.3% of frequent fits), loss of bowel control (36.5% of which 4.5% were frequent), and pressure sores for 14.1% of the persons at the time of the survey (cf. Table 3). These different complications are strongly interrelated, in a significant way, except for pressure sores and pain ($P=0.18$). On the other hand, they

Table 2 Reported causes of rehospitalisations

	n	%
Urinary complications	534	32.1
Systematic follow-up	461	27.7
Pressure sores	329	19.7
Respiratory complications	226	13.6
Contractures	160	9.6
Bowel complications	158	9.5
Pain	151	9.1
Secondary fractures of lower limbs (without surgery)	56	3.4
Osteoma	50	3
Secondary fractures of lower limbs (with surgery)	40	2.4
Secondary fractures of upper limbs (without surgery)	23	1.4
Secondary fractures of lower limbs (with surgery)	17	1
Others	240	14.4

Table 3 Prevalence of reported complications at the time of the survey

	n	%
Awkward contractures		
No	249	15.2
Sometimes	861	52.7
Often	523	32
Pain		
No	373	26.2
Sometimes	546	38.3
Often	505	35.5
Embarrassing urinary leakage		
No	700	44
Sometimes	589	37
Often	301	18.9
Perspiration attacks		
No	842	52.7
Sometimes	576	36
Often	180	11.3
Embarrassing bowel leakage		
No	1016	63.5
Sometimes	512	32
Often	72	4.5
Pressure sores		
Yes	224	14.1
No	1369	85.9
Others	265	15.9

Table 4 Awkward contractures and associated factors

	No		*Sometimes*		*Often*		P
Age at accident[a]	28.7		29.6		32.0		***
Age at survey[a]	42.7		42.6		45		***
Time since injury[a]	13.9		13		12.1		**
	n	%	n	%	n	%	
Gender							NS
Males	195	15	691	53	418	32	
Females	54	16.5	169	51.5	105	32	
Motor lesion							
Complete	147	17.8	450	54.3	231	27.9	**
Incomplete	93	12.8	382	52.5	253	34.8	
Sensory lesion							NS
Complete	102	17.4	311	53.2	172	29.4	
Incomplete	133	13.5	525	53.4	325	33.1	
Level of lesion							NS
C1–C2	11	10.1	58	53	39	36.1	
C3	36	13.2	146	53.5	91	33.3	
C4	66	15.1	233	53.3	138	31.6	
C5	66	16.4	219	54.5	117	29.1	
C6	39	15.5	134	53.2	79	31.1	
C7–C8	6	20	14	46.7	10	33.3	
Level of education (in years)							***
<5	26	14.1	88	47.6	71	38.4	
5 to 9	27	13	106	51.2	74	35.7	
10 to 11	74	14.4	293	57	147	28.6	
12 to 13	32	16.4	104	53.3	59	30.3	
14 to 15	20	17.5	51	44.7	43	37.7	
16	9	10.6	48	56.5	28	32.9	
>16	28	33.7	40	48.2	15	18.1	
Academic achievement							**
No schooling	5	27.8	9	50	4	22.2	
Primary education	34	11.6	155	52.9	104	35.5	
Secondary education	118	14.8	435	54.6	243	30.5	
Higher education	70	21.8	161	50.2	90	28	
Occupational status (at injury)							**
Retired	7	12.7	21	38.2	27	49.1	
Active	164	14.9	576	52.3	361	32.8	
Unemployed	8	9.3	50	58.1	28	32.6	
Others	64	17.6	204	56	96	26.4	

[a]Mean in years. NS: not significant; *$P<0.05$; **$P<0.01$; ***$P<0.001$

differed regarding the factors to which they were associated.

Special attention has to be given to the link between the age at the time of the accident, time elapsed between the accident and the survey and the rate of complete neurological deficit: the persons whose injury occurred with the greatest time elapsed between injury and time of the survey, were those who had had the accident at the youngest age ($P=0.001$), they also presented more often with a complete neurological lesion ($P=0.001$).

Awkward contractures

These were significantly more frequent in patients with an incomplete motor lesion ($P=0.002$), who were older, be it at the time of injury ($P<0.001$) or at the time of the survey ($P=0.003$), and in those whose accident was recent ($P=0.009$). The results are shown in Table 4.

Pain

The presence of pain was correlated with an incomplete motor and sensory lesion at the time of the survey ($P=0.003$), with an older age, either at the time of injury ($P<0.001$), or that of the survey ($P<0.001$). Pain is more frequent in TSCI persons whose injury was recent ($P=0.05$) and with lower socio-professional status at the time of injury ($P=0.001$): the rates were higher for retirees, the unemployed, for those who had never attended school or who had a low educational level, whether or not the persons had incomplete or complete motor lesions (cf. Table 5).

Table 5 Pain and associated factors

	No		*Sometimes*		*Often*		P
Age at accident[a]	26.8		28.8		34.9		***
Age at survey[a]	40.5		41.8		47.2		***
Time since injury[a]	13.7		13		12.3		*
	n	%	n	%	n	%	
Gender							NS
Males	310	27.3	434	38.2	391	34.4	
Females	62	21.5	112	38.9	114	39.6	
Motor lesion							
Complete	219	30.3	257	35.5	247	34.2	**
Incomplete	145	22.7	272	42.5	223	34.8	
Sensory lesion							**
Complete	159	30.6	181	34.9	179	34.5	
Incomplete	206	24	352	40.9	302	35.1	
Level of lesion							NS
C1–C2	15	16.1	39	41.9	39	41.9	
C3	71	31.1	82	36	75	32.9	
C4	102	26.7	145	38	135	35.3	
C5	91	25.8	132	37.4	130	36.8	
C6	61	26.8	103	45.2	64	28.1	
C7–C8	9	34.6	7	26.9	10	38.5	
Level of education (in years)							**
<5	38	25	57	37.5	57	37.5	
5 to 9	32	18	70	39.3	76	42.7	
10 to 11	112	25.3	184	41.5	147	33.2	
12 to 13	55	31.3	64	36.4	57	32.4	
14 to 15	34	33.7	38	37.6	29	28.7	
16	24	32	32	42.7	19	25.3	
>16	30	39	27	35.1	20	26	
Academic achievement							***
No schooling	4	23.5	5	29.4	9	47.1	
Primary education	55	22.1	97	39	97	39	
Secondary education	181	26.3	272	39.5	235	34.2	
Higher education	106	36.3	111	38	75	25.7	
Occupational status (at injury)							***
Retired	8	16.7	11	22.9	29	60.4	
Active	248	26	360	37.8	345	36.2	
Unemployed	14	18.7	30	40	31	41.3	
Others	99	30.3	133	40.7	95	29.1	

[a]Mean in years. NS: not significant; *$P<0.05$; **$P<0.01$; ***$P<0.001$

Embarrassing urinary leakage

Frequent urinary leakage was correlated with subjects with a complete neurological lesion ($P<0.001$). There was no correlation with the subject's age, either at the time of injury ($P=0.69$) or of the survey ($P=0.39$), time since injury ($P=0.69$), occupational status at the time of injury ($P=0.78$), the level of education ($P=0.81$) or academic achievement ($P=0.37$) (cf. Table 6).

Pressure sores

The presence of pressure sores is correlated with complete motor and sensory lesion ($P<0.001$ and $P=0.002$, respectively), previous history of pressure sores in the acute phase ($P<0.001$) or during subsequent evolution ($P<0.001$). They were significantly more frequent in subjects whose injury occurred at a younger age ($P<0.001$), whereas the age at the time of the survey was no longer a relevant factor ($P=0.07$). The presence of pressure sores increased with time elapsed since injury ($P<0.001$), but we have to remember that in our population, the longest delay from injury is linked to the rate of complete neurological lesion ($P=0.001$).

Pressure sores were more frequently reported by subjects with the lowest socio-economic status: unemployment at the time of injury ($P<0.001$), low educational level ($P=0.03$) or limited academic achievement ($P<0.001$). The lowest rates of pressure sores are observed with active subjects, or with subjects with a higher level of education (cf. Table 7).

These results are all the more significant in that there is no difference in academic achievement between

Table 6 Embarassing urinary leakage and associated factors

	No		*Sometimes*		*Often*		P
Age at accident[a]	30		30.5		30.8		NS
Age at survey[a]	42.7		43.4		43.9		NS
Time since injury[a]	12.7		12.9		13.1		NS
	n	%	n	%	n	%	
Gender							NS
Males	576	45.4	454	35.8	239	18.8	
Females	124	38.8	134	41.9	62	19.4	
Motor lesion							
Complete	325	40.1	295	36.4	190	23.5	***
Incomplete	356	49.4	267	37	98	13.6	
Sensory lesion							***
Complete	226	39	214	37	139	24	
Incomplete	450	46.7	360	37.4	153	15.9	
Level of lesion							NS
C1–C2	54	50	32	29.6	22	20.4	
C3	125	46.6	95	35.4	48	17.9	
C4	194	45.4	153	35.8	80	18.7	
C5	166	42.7	145	37.3	78	20.1	
C6	94	38.1	110	44.5	43	17.4	
C7–C8	12	40	11	36.7	7	23.3	
Level of education (in years)							NS
<5	81	45.8	58	32.8	38	21.5	
5 to 9	88	44.7	69	35	40	20.3	
10 to 11	225	44.8	182	36.3	95	18.9	
12 to 13	88	45.8	72	37.5	32	16.7	
14 to 15	51	45.1	45	39.8	17	15	
16	36	42.9	39	46.4	9	10.7	
>16	38	45.8	28	33.7	17	20.5	
Academic achievement							NS
No schooling	5	27.8	8	44.4	5	27.8	
Primary education	123	43.8	96	34.2	62	22.1	
Secondary education	348	44.7	287	36.8	144	18.5	
Higher education	144	45.3	124	39	50	15.7	
Occupational status (at injury)							NS
Retired	21	44.7	15	31.9	11	23.4	
Active	484	45.1	392	36.5	197	18.4	
Unemployed	30	36.1	31	37.3	22	26.5	
Others	155	43.2	141	39.3	63	17.5	

[a]Mean in years. NS: not significant; *$P<0.05$; **$P<0.01$; ***$P<0.001$

persons with either complete or incomplete motor or sensory lesion.

Discussion

This survey is the largest, as far as the number of persons questioned is concerned, and which is aimed at specifically studying the mid- and long-term outcome of TSCI persons. The survey was performed by means of a self-administered questionnaire and so obtained the patient's personal views of their own situation. We have to raise the point that most of our data are based on subjective responses. Subjective data are less reliable than objective data (patients in the same condition may report their condition differently because their perception is different) but subjective data are key factors to health service access. This choice was not only an argument for feasibility of the survey with the size of the population being studied, it was an assumed choice to access the individual's point of view about their complications rather than medical considerations. However, another part of the survey is aimed at gathering objective data. Looking at these methodological concerns, quality of response was controlled and internal coherence of data was verified and corrected.

Medical, functional, psychological and social data could be recorded simultaneously. This multi-dimensional aspect is essential because it makes it possible to better understand the mutual interaction between physiology and the environment as a whole. However, we have to highlight that this is not an analysis of risk factors for each complication, but an analysis of clinical and environmental associated factors.

Table 7 Pressure sores and associated factors

	No		*Yes*		P
Age at accident[a]	32		29.3		***
Age at survey[a]	4.4		42.9		*
Time since injury[a]	11.6		13.7		***
	n	%	n	%	
Gender					NS
Males	1090	85.3	278	89.1	
Females	278	89.1	34	10.9	
Motor lesion					
Complete	660	80.9	156	19.1	***
Incomplete	665	92	58	8	
Sensory lesion					***
Complete	475	82.5	101	17.5	
Incomplete	857	88.2	115	11.8	
Level of lesion					NS
C1–C2	94	89.5	11	10.5	
C3	232	86.9	35	13.1	
C4	363	84.6	66	15.4	
C5	335	86.1	54	13.9	
C6	214	86.6	33	13.4	
C7–C8	26	89.6	3	10.4	
Level of education (in years)					*
<5	145	80.6	35	19.4	
5 to 9	167	83.1	34	16.9	
10 to 11	439	87.8	61	12.2	
12 to 13	165	86.8	25	13.2	
14 to 15	106	93	8	7	
16	73	89	9	11	
>16	77	91.7	7	8.3	
Academic achievement					***
No schooling	12	66.7	6	33.3	
Primary education	234	81.5	53	18.5	
Secondary education	679	87.4	98	12.6	
Higher education	287	90.3	31	9.7	
Occupational status (at injury)					*
Retired	4	8.5	43	91.5	
Active	168	15.6	912	84.4	
Unemployed	12	14.6	70	85.4	
Others	33	9.2	324	90.8	

[a]Mean in years. NS: not significant; *$P<0.05$; **$P<0.01$; ***$P<0.001$

The initial, biographical characteristics of the survey population did not differ from those of other epidemiological studies.[6–17]

Generally speaking, the major finding highlighted in this work is the very high occurrence of some complications in these persons: over half reported contractures, urinary leakage and/or pain.

It also arises that certain persons, in the mid- and long-term, presented a growing risk of complications; this vulnerability which cannot be entirely attributed to a higher level of impairment.

We have to stress the incidence of differential mortality bias in some complications: older age patients, patients with higher injury level or complete lesion are more likely to die before the survey is conducted. This differential mortality bias affects the relationship between time after injury and prevalence of medical complications. It increases with advancing time after injury.

Rehospitalisations

In the present study, the analysis of the number and duration of hospitalisations between initial injury and the survey allowed us to highlight a smaller sub-group of persons who were hospitalised more frequently and above all for a longer duration of stay than the overall survey population: this may be explained by a higher degree of impairment[23–27] but also by differences in educational level,[24–25] socio-economic status,[25,28,29] or again by a poorer adaptation to disability.[24] This finding also appears in some other studies on spinal cord injured persons in general. According to Meyers *et al*,[30] 8% of injured persons

make up 22% of rehospitalisations and 59% of the care burden.

In this study, the number of rehospitalisations increased with time through a cumulative phenomenon. In the literature, its incidence is higher during the first 5 years, then it decreases, as though some equilibrium had been reached, it then increases again after approximately 20 years of evolution.[15–27] Urinary complications and pressure sores are the two main reasons for hospital readmissions in people with chronic spinal cord injury.[27] With the passing of time some complications are reported less frequently: awkward contractures, pain, whereas others are more frequent: perspiration attacks, pressure sores, which may be attributed to a lesser vigilance towards prevention and to the ageing of the body's different physiological systems.

Combinations of complications

Frequent association between these complications was noted, except between pressure sores and pain. This lack of link may be explained by the different types of lesions which favour them: incomplete ones for pain and complete ones for pressure sores. These were not, therefore, the same subjects. Moreover, motor and sensory conservation, associated with the presence of pain, is a protecting factor against pressure sores through its role as an alarm.

Many such associations can be found in the literature either concerning pressure sores,[31–35] urinary complications[36] or pain.[37–39] They are linked to the complex, unstable physiological balance after a spinal cord lesion. An initially localised imbalance starts a chain of changes which result in the more or less rapid emergence of complications and the creation of real vicious circles.[40]

Awkward contractures

Contractures were the most frequent complications reported by spinal cord injured persons. In this study only 15% of subjects had none; yet paradoxically, very few studies on their prevalence exist. They seem to be favoured by incomplete neurological lesion in this survey and in other studies.[41–43] Dimitrijevic *et al*,[44] noted that partial preservation of cerebral influence on the sub-lesion spinal cord contributes to the occurrence of hyper-excitability which may be found in the form of spasticity and osteotendinous hyper-reflexiveness. Contractures diminish with time, probably owing to the occurrence of atrophic changes in sub-lesion muscle fibres: amyotrophic sclerosis and loss of compliance.

Pain

An overall rate of 73.8% of persons suffering pain was noted, of which 35.5% had frequent pain, with one third in severe pain. In studies which do not distinguish paraplegic and tetraplegic SCI persons, this rate varies from 14% to 94%, according to whether or not the lowest intensity is taken into account, with a majority of studies reporting a prevalence of about 60% to 70%, with 20% to 30% of intense pain.[37–39,45–53]

The age, whether at the time of injury or at the time of the survey was correlated with the presence of pain, this is confirmed by the majority of studies.[14,37–39,50,54,55] For Richards,[55] age would represent the best predictive factor for pain occurrence. The explanation could be the decrease in plasticity of the central nervous system with age, as far as neurogenic pain is concerned,[39] as well as over-use of supra-lesional joints for osteo-articular pains.[56]

A greater frequency of pain was noted in patients suffering from incomplete neurologic lesions – a correlation which is also confirmed by most of the publications[38,39,50,52,55–58] and is also found in persons with a lower socio-professional status, either before the injury or at the time of the survey: unemployment, low level of education or poor academic achievement, which underlines the importance of the psychosocial component when considering pain.[53–55,58–60]

Embarrassing urinary leakage

No other study could be found showing, as in the present case, that there are very few factors associated with the presence of urinary leakage, apart from factors linked to the severity of clinical condition: complete motor and sensory lesion, connection with all the other complications. This complication seems to be the reflection of a more severe impairment, and independent from more individual or environmental factors. Although it is not significant, it can be noted that urinary leakage tends to be more frequent in women.

Skin complications

The major risk factor reported in the literature is first and foremost the complete neurological nature of the lesion well before the difference in the level of lesion between tetraplegics and paraplegics.[26,31–33,35,41,54,56,61,62] Previous histories of skin complications are also a major risk factor in the occurrence of pressure sores. On the one hand, this is due to the fragility of skin around scars but, and on the other hand, more especially because it is a risk factor of a relapse, whatever the level of the lesion.[35,63,64] In this study, the rate increases from factor 3 to 4 and for Berkley,[63] a factor of 4. This vulnerability may be linked to more severe impairments, to maladjusted behaviour,[28,65,66] to low socio-economic and educational status: low level of education, unemployment.[31–33,35,64,67]

Conclusion

The TSCI persons who took part in this survey reported a very high percentage of complications,

which were, for the most part, interrelated. This rate may increase due to the ever-increasing survival rate among subjects of increasingly higher level of neurologic lesions, and the ageing of the existing population. It is thus important to care for the long-term outcome of these patients, a field on which few researchers have been focusing as compared to the initial phase of rehabilitation. Associated factors have been identified in a general way and for each principal complication. Contractures were more frequent in subjects with incomplete neurological impairment. Pain was also correlated with the incomplete aspect of the lesion but also with older age and poor socio-professional status. Urinary leakage reflects the degree of impairment. Skin complications are strongly correlated with the degree of impairment, in addition to previous history of sores and with an unstable psychosocial status. These data underline the interest for continuing research in this domain, while taking into account the different aspects which make up the individual. Early identification of risk factors and a better understanding of the neophysiological balance of spinal cord injured persons will allow better secondary and tertiary prevention policies and to favour the inclusion of severely disabled persons, while still continuing efforts with regard to primary prevention.

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Appendix

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