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Clinical Study

Long-term survival after chronic subdural haematoma

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ABSTRACT

Outcome after chronic subdural haematoma (CSDH) is invariably assumed favourable: however, little data regarding long term survival (LTS) exists. One study reported excess mortality restricted to year 1, but with expected actuarial rates thereafter. We aimed to determine LTS after CSDH in a retrospective analysis relative to actuarial data from age-matched controls. Data was obtained in n = 155, (M:F 97:58, 69.3 ± 2.3 years). Follow-up maxima was 14.19 years (mean: 4.02 ± 3.07 years, median: 5.2 years). Mortality in-hospital, at 6 months, 1 year, 2 years and 5 years was n = 13 (8.39%), n = 22 (14.19%), n = 31 (20.35%), n = 42 (27.1%) and n = 54 (34.84%). LTS was significantly worse than controls (5.29 ± 0.59 years vs. 17.74 ± 1.8 years, hazard ratio [HR]: 3.52, $P < 0.0001$). Death most frequently related to pneumonia/sepsis and ischemic heart disease (IHD). Median modified Rankin score (mRS) in those discharged home (n = 94, 60.65%) was 2 [IQR: 1–3]. Discharge mRS in those who died at 6 months, 1 year, 2 years and 5 years was 5 [IQR: 3–6], 5 [IQR: 4–6], 3 [IQR: 1–3], 4 [IQR: 2–5]. Discharge mRS was significantly worse with year 1 mortality ($P = 0.014$). LTS related to discharge mRS (HR: 37.006, $P < 0.001$), post-operative motor-score (HR: 0.581, $P = 0.0026$), IHD (HR: 5.186, $P = 0.005$), warfarin-use (HR: 5.93, $P = 0.036$) and dementia (HR: 5.39, $P = 0.031$). No long term recurrences (LTR) were recorded. Although most were discharged home with mRS = 2, LTS was markedly less than previously reported: peers lived 12.4 years longer. Although greater in year 1, excess mortality was not restricted to year 1, but continued throughout prolonged follow-up. LTS related to discharge disability and dependence, and co-morbid risk factors for cerebral atrophy. No LTR suggests that, once ultimately closed, the 'subdural space' remains closed. CSDH patients represent a vulnerable group who require continued long-term medical surveillance.

1 Introduction

Outcome after chronic subdural haematoma (CSDH) is invariably assumed favourable: however, little data regarding long term survival (LTS) exists. A sentinel study reported that long term survival (LTS) was reduced after CSDH [1]. However, the magnitude of LTS reduction relative to controls in that study was small [1]. Further, excess mortality was demonstrated only in year 1: no genuine long term trend was demonstrated [1]. Finally, whilst the authors had speculated that co-morbidities explained LTS reduction, they provided little corroborative data [1]. Indeed, owing to the study design, the actual causes of death could not be identified [1].

We set out to both validate, and extend upon, aforementioned preliminary findings [1] by examining co-morbidities, and direct causes of death, after CSDH in a potentially more representative CSDH sample.

2. Methods

A retrospective chart review of prospectively collected data was performed in all adult patients (aged over 18 years) operated upon for CSDH at our hospital between 2006 and 2011. Actuarial data was obtained from Australian Bureau of Statistics, with special reference to the State where our study was performed (25/02/14) [2]. LTS was assessed by obtaining data from The Registry of Births, Deaths and Marriages. Children less than 18 years old were excluded because chronic subdural collections in this age group potentially represent a distinct pathological entity [3]. Local Institutional Review Board approval was obtained for the study, who agreed to waive individual consent.

A history of head injury, trauma, fall or alcohol abuse was specifically sought in every case as part of the admission process,

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Table 1
Risk factors for chronic subdural haematoma (CSDH) and cerebral atrophy assessed

Parameter	DF	Parameter Estimate	Standard Error	Chi-Square	P value	Hazard Ratio	95% Hazard Ratio Confidence Limits	
Age (at presentation)[¥]	1	0.00538	0.02454	0.0481	0.8264	1.005	0.958	1.055
Sex	1	−0.2308	0.52097	0.1963	0.6577	0.794	0.286	2.204
Past Medical History								
Hypertension[#]	1	−0.89456	0.54519	2.6923	0.1008	0.409	0.14	1.19
Diabetes Mellitus[#]	1	0.526045	0.86546	0.8342	0.3441	4.752	0.068	145.26
Hyperlipidaemia[#]	1	2.17657	1.14872	3.373	0.0875	8.16	0.84	77.433
Atrial fibrillation[#]	1	1.64655	0.09869	7.7877	0.0952	5.176	1.783	16.325
Stroke[#]	1	−0.25957	0.58974	0.1937	0.6598	0.771	0.243	2.451
[*]Dementia[#]	1	1.68485	0.78003	4.6655	0.0308	5.392	1.169	24.87
Ischemic heart disease[#]	1	1.64605	0.58969	7.7917	0.0052	5.186	1.633	16.475
Coagulation disorders (any cause)[#,¥]	1	20.67575	1149	0.0003	0.9856	9.54E + 08	0	.
Premorbidly independent	1	0.25973	0.59242	0.1922	0.6611	1.297	0.406	4.141
Renal dialysis[#]	1	−2.8941	1.75087	2.7323	0.0983	0.055	0.002	1.712
Epilepsy[#,¥]	1	2.10049	1.14882	3.343	0.0675	8.17	0.86	77.643
VP shunt/Lumbar drain[¥]	1	1.59381	1.7234	0.8553	0.3551	4.922	0.168	144.26
Documented alcoholism[#,¥]	1	0.53044	0.68169	0.6055	0.4365	1.7	0.447	6.466
Drug History								
[*]Warfarin[#,¥]	1	1.78076	0.84994	4.3897	0.0362	5.934	1.122	31.394
Aspirin[#,¥]	1	0.38058	0.5334	0.5091	0.4755	1.463	0.514	4.162
Clopidogrel[#]	1	−0.27545	0.77156	0.1274	0.7211	0.759	0.167	3.445
ACE-inhibitors[#]	1	0.34764	0.51507	0.4556	0.4997	1.416	0.516	3.885
Angiotensin receptor blockers[#]	1	1.41032	0.85225	2.7384	0.098	4.097	0.771	21.774
Clinical Presentation								
History of head injury/trauma/fall[¥]	1	−0.0352	0.4882	0.0052	0.9425	0.965	0.371	2.513
Headache	1	−2.49522	1.96657	1.6099	0.2045	0.082	0.002	3.893
Nausea/vomiting	1	−0.66463	0.63507	1.0952	0.2953	0.514	0.148	1.786
Gait instability	1	0.48439	0.43491	1.2405	0.2654	1.623	0.692	3.807
[*]Motor power	1	−0.54353	0.18031	9.0867	0.0026	0.581	0.408	0.827
Seizures[¥]	1	0.63227	7846	0	0.9999	1.882	0	.
GCS < 15	1	0.91441	0.5467	2.7976	0.0944	2.495	0.855	7.286
Duration of symptoms (in days)	1	0.01602	0.00957	2.8011	0.0942	1.016	0.997	1.035
CT Findings								
Atrophy[¥]	1	0.1453	1.32761	0.012	0.9128	1.156	0.086	15.602
Bilateral/Unilateral SDH	1	−0.79449	0.49079	2.6205	0.1055	0.452	0.173	1.182
Midline shift	1	0.51590	1.23732	0.1738	0.6767	1.675	0.148	18.935
Clot thickness	1	0.66888	0.48455	1.9056	0.1675	1.952	0.755	5.046
Outcome								
Operated/not operated	1	−0.79125	0.73311	1.1649	0.2805	0.453	0.108	1.907
[*]Poor (3–5) post-treatment modified Rankin score	1	3.61108	0.60718	35.3701	<.0001	37.006	11.257	121.649
Recurrence	1	0.06127	0.52533	0.0136	0.9072	1.063	0.38	2.977

[*] Statistical significance.
[#] Risk factors for atrophy.
[¥] Risk factors for CSDH formation per se.
DF = degrees of freedom, GCS = Glasgow coma scale.

and corroborated by a consensus between the patient (where score on Glasgow coma scale [GCS] = 15), or the patient's family and/or referring physician (GCS < 15). A history of other risk factors (Table 1) was also routinely sought as part of the admission process and corroborated by a consensus between the patient (where GCS = 15), the patient's family and/or referring physician. A full blood count and coagulation screen were routinely performed for all patients. The presence of a cerebrospinal fluid (CSF) shunt was confirmed by physical and radiological examination. Cerebral atrophy was assessed on CT scans by a single observer (AM) according to a prior methodology and classification (ICC = 0.89) [4].

All patients underwent the same operative procedure: i.e. 2 burr holes with saline irrigation for each CSDH, combined with a subdural drain for 24–48 h. Recurrences were defined as symptoms attributable to a recollection requiring re-operation during convalescence after surgery. Post-operative neurologic and functional status was assessed by both the physiotherapists and occupational therapists: disability and dependency were recorded using the modified Rankin score (mRS). Post-operative motor power (Medical Research Council UK scale) in the worst of any affected limb, as well as discharge destination, were also recorded.

2.1. Statistical analysis

Data were analysed using a chi-squared test (non-continuous data) or a two-tailed *t*-test (continuous data). Consistency of subjective atrophy assessments was measured by intra-class correlation (ICC). Hazard ratio (HR) and cumulative survival were calculated using the Cox Proportional Hazards Model adjusting for covariates, and the Kaplan–Meier approach. All calculations were carried out on Microsoft Excel and SAS (University Edition).

3. Results

Data was obtained in n = 155, (M:F 97:58, mean age at presentation 69.3 ± 2.3 years) (Table 1). Follow-up maxima was 14.19 years (mean: 4.02 ± 3.07 years, median: 5.2 years). Of n = 155, n = 93 (60%) were still alive by June 2015 (M:F 63:30). Actuarial data predicted a Life expectancy for males of mean age 68 ± 15 years to be 17.6 years (i.e. to be 85.6 years at death) [2]. Life expectancy for females of mean age 72 ± 13 years was predicted to be 15.4 years (i.e. to be 87.4 years at death) [2].