Natural History of a Steroid Naive Duchenne Muscular Dystrophy Cohort

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BACKGROUND AND AIM

The natural history of steroid naive patients with Duchenne muscular dystrophy (DMD) is important in evaluating the effect of steroid treatment. The National Rehabilitation Centre for Neuromuscular Diseases in Denmark registers and regularly monitors the total Danish population of boys with DMD in a lifelong course from time of diagnosis. The latest steroid naive cohort representing the total Danish DMD population was born in the decade 1983-1992. This study presents the ages at major clinical events in this cohort.

METHOD

Data on age at loss of ambulation, spinal surgery, 50 % FVC, introduction of assisted ventilation (non-invasive and invasive), and death were collated from the notes of systematic assessments of all patients born in the period 1983-92. Description of causes of death among those who died and functional ability among the living persons (as of July 2013) measured with Egen Klassifikation2 (EK2) is presented. Kaplan Meier analysis was performed on the ages of major clinical events.

RESULTS

In that decade, the total Danish population of boys fulfilling the diagnostic DMD-criteria (Emery A) was 53. In July of this year, 70% were alive (n=37). 75% (n=40) of the total cohort had undergone spinal surgery, 74% (n=39) used or had used non-invasive assisted ventilation (NIV) and 62% (n=33) used or had used invasive assisted ventilation (IV). 13% had not used assisted ventilation. At introduction to NIV, median FVC% was 24 (5-49) and to IV median FVC% was 21 (5-40). There was a significant relationship between age at loss of ambulation and age at introduction to invasive ventilation. There was no relationship between age at loss of ambulation and age at death or age at introduction to non-invasive ventilation. Ages at clinical events: see Figure 1 and 2 and Table 1.

RESULTS CONTINUED

The surviving young men between 21 and 30 years could all drive their powered wheelchairs with adapted joysticks. All of them used assisted ventilation either as NIV for those who were respiratory insufficient at night only and IV for those who were respiratory insufficient both day and night. The muscle strength they had in their hands allowed them to write on a computer by means of the joystick on the wheelchair. They were dependent on help in all other activities. The younger group (age 21-25) functioned significantly better than the older group (age 26-30) as assessed with EK2 (Figure 3). While items affliliated with physical activity deteriorated with age, items such as well-being, fatigue and ability to speak did not deteriorate.
30% of the cohort (n=16) had passed away (Fig. 4). Main cause of death in 15 of these was cardiac insufficiency (see Table 2).

CONCLUSION

This study shows that death in a DMD population supported with assisted ventilation is primarily due to cardiac insufficiency, often in conjunction with minor surgery.

Fig. 1

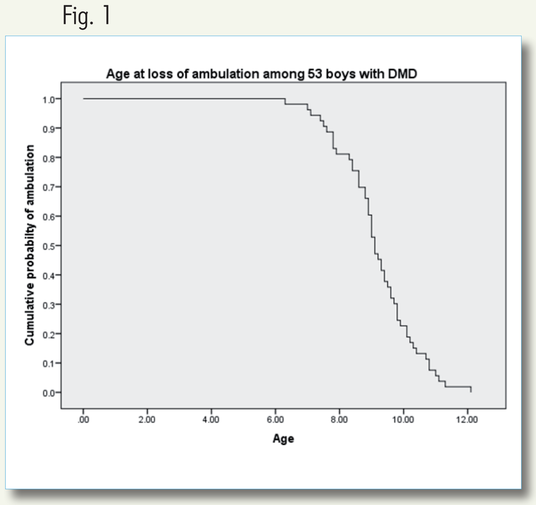

Fig. 2

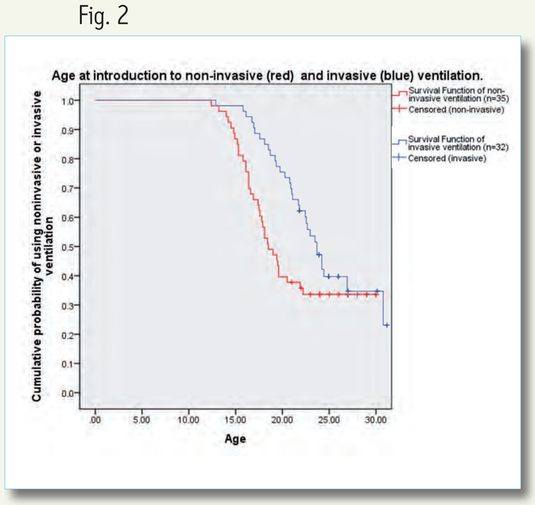

Fig. 3

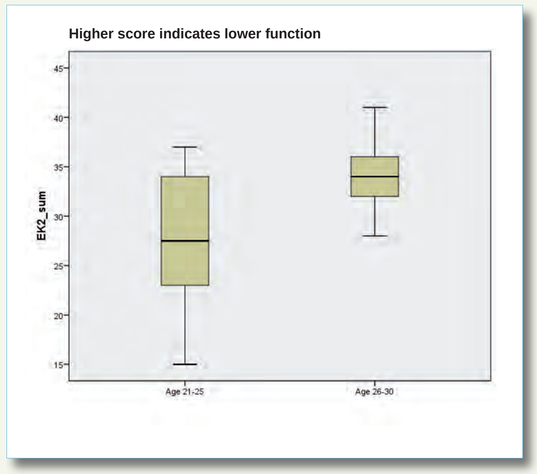

Fig. 4

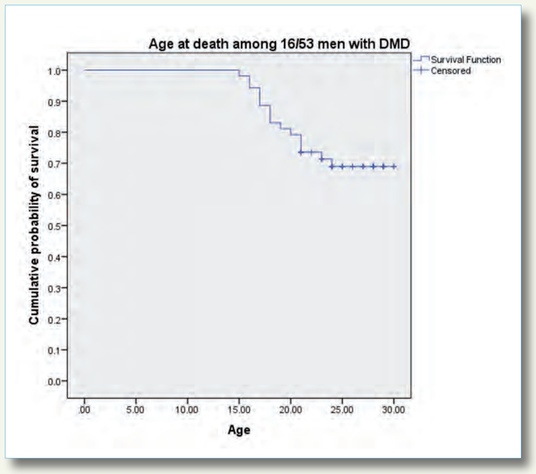

TABLE 1 MEDIAN AGES AND RANGES IN YEARS FOR MAJOR CLINICAL EVENTS

Loss of ambulation(n=53)	Spinal surgery(n=40)/53	40-50% FVC(n=43)/53	Non-invasive ventilation(n=39)/53	Invasive ventilation (n=33)/53	Death (n=16)/53
9.1 (6-12)	14.8 (12-19)	14.1 (11-18)	17.5 (12-23)	20.2 (12-30)	18.5 (15-24)

TABLE 2 AGES AT- AND CAUSES OF DEATH IN RELATION TO TYPE OF ASSISTED VENTILATION

	Age at death	Cardiac failure As the only cause	Cardiac failure and infection	Cardiac failure and constipation	Cardiac failure and ruptured abdominal ventricle	Acute bleeding from ulcer in ventricle
No use of assisted ventilation (n=7)	16.8 yrs (14.8-18.5)	3	3	1	0	0
Use of non-invasive assisted ventilation (n=2)	18 yrs	1	1	0	0	0
Use of invasive assisted ventilation (n=7)	21.2 yrs (18.7-24.1)	2	2	1	1	1