Early onset dementia in New Zealand Pacific boxers: a case series

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ABSTRACT

AIM: To describe the biopsychosocial characteristics of a series of Pacific men living in South Auckland with a history of boxing presenting with early onset dementia. We discuss the history of boxing in Pacific people and the possibility of increased risk of early onset dementia in New Zealand Pacific men compared to their European counterparts.

METHOD: We reviewed the files of Pacific men with a history of amateur or professional boxing who presented to our memory and older adult mental health services with early onset dementia over a 45-month period. We gathered relevant information to construct a biopsychosocial paradigm as possible explanation of this phenomenon.

RESULTS: We identified a series of eight New Zealand Pacific men with early onset dementia and with a history of boxing. Alcohol was a contributing factor in seven of the eight cases, and vascular risk factors in five.

CONCLUSION: Historical, cultural and socio-economic factors underpin the attraction of some Pacific men to boxing as a sport. Given that New Zealand Pacific peoples may have an earlier onset of dementia than their European counterparts, further research is required to establish whether boxing is a contributory factor. Sports physicians should advise young New Zealand Pacific boxers about the long-term risks associated with their sport.

We present a case series of eight former amateur or professional boxers, all of Pacific background and all living in South Auckland, New Zealand, seven of whom present with early onset dementia (onset prior to age 65) and one with onset of dementia at age 71. The series is interesting and unusual for various reasons: first, it represents an unusually large number of people with early onset dementia from a single ethnic grouping; second, it identifies a unique subcultural typology involving issues of history, identity and masculinity; third, it casts some light on the growing understanding of the probable multi-factorial nature of early onset dementia in boxers; and fourth, it suggests that a large scale dementia prevalence study is needed in New Zealand to determine whether New Zealand Pacific people present with earlier onset dementia compared to their European counterparts.

The eight cases described below had all been referred either to the Memory Team or the Mental Health Service for Older People at Middlemore Hospital in South Auckland during the 45-month period between 23 December 2011 and 3 September 2015. Middlemore Hospital is a large teaching hospital that is governed by Counties Manukau District Health Board (CMDHB), which serves the people of seven localities in South Auckland: Mangere, Otara, Papatoetoe, Howick, Manurewa, Papakura and Franklin. Based on a 2011 census, the total estimated population of these seven localities is 500,000, of which 49% were male. Just under 49,000, or 10%, of the population is over 65 years of age, compared to the New Zealand average of 13%. The ethnic
breakdown is as follows: Māori 84,000 (17%), Pacific people 111,500 (22%), Indian 41,800 (8%), other Asian, predominantly Chinese, 59,400 (12%), and ‘other’, predominantly white New Zealanders of European ancestry, 204,200 (41%). CMDHB has almost twice as many Pacific people than any other DHB in the country, and their numbers are projected to increase by 66% in the period 2006–2026, compared to 40% for all other ethnicities. Pacific people represent 16% of the population aged between 45 and 64 in Counties Manukau. This compares with New Zealand European (50%), Asian (23%) and Māori (12%).

At CMDHB, dementia is mostly diagnosed by the Memory Team: between 2013 and 2016 the ethnicities of those who received a new diagnosis were New Zealand European (39%), Pacific (35%), Māori (12%), non-New Zealand European (11%) and Asian (3%) (Cullum S, 2018 personal communication).

Method

The files of nine men were reviewed. These nine men had presented with early onset dementia to either the Memory Team or the Mental Health Services for Older People. We collected data on the following variables: current age, ethnicity, marital status, boxing history (including, where available, number of fights, number of concussions and number of episodes of loss of consciousness), schooling, employment, medical history, family history, age of onset of cognitive decline, mental state examination, neuro-psychological assessment and brain imaging results.

Consent for release of medical information and its publication was sought from next of kin. Eight of nine next of kin consented.

Results

We have separated the cases’ age and ethnicities from their histories in order to reduce the chance of identification. The age of onset of cognitive decline ranged from age 46 to age 71: Four cases were aged between 45 and 55, four were aged between 56–65, and one was over 65. Of the eight cases, six were Samoan and two were Tongan.

Case 1

A married man who was a professional boxer in his Pacific country of origin for 15 years. He had been knocked out several times and had suffered numerous concussions, but had never been hospitalised from his boxing. His schooling was limited and he moved to New Zealand after his retirement. He drank alcohol excessively and had police charges of dangerous driving and domestic assault. Six years after retirement, he was noted to have delusions of infidelity, was convinced that his daughter’s boyfriend was having an affair with his wife and threatened to kill them with a machete. He also had auditory hallucinations of Satan, and accompanying religious and grandiose delusions. He was treated with Olanzapine. Two years later, his Rowland Universal Dementia Assessment Scale (RUDAS) score was 16/30, indicating moderately severe cognitive impairment. One year later, neuropsychological assessment showed global severe cognitive impairment, and two years later, he was noted to have ataxia, tremor and lack of spontaneous speech.

Case 2

A married man whose boxing career started in childhood in his country of origin and lasted 11 years. He also played rugby and was knocked out twice, and drank heavily in his youth. He worked as a storeman. He presented with cognitive impairment: Addenbrooke’s Cognitive Examination (ACE) score at presentation was 53/100 and Mini Mental State Examination (MMSE) score was 15/30. He was commenced on donepezil. Five years after presentation, he developed delusions that his son in law was stealing his clothes and he was treated with Risperidone. He subsequently developed delusions of infidelity towards his wife and threatened her with a knife. He became increasingly dependent on his wife for his activities of daily living, and eight years after presentation was placed in a rest home.

Case 3

A married man who had boxed for four years and sustained multiple concussions. He had limited primary schooling and worked in a factory. He drank heavily
throughout his life and had a history of type 2 diabetes mellitus, hypertension and hyperlipidaemia. A younger brother also suffered from dementia. Two years prior to presentation, he developed REM sleep disturbances and his driving deteriorated. At presentation, his RUDAS score was 8/30. Subsequently, a knife was found in his bed and he had made threats to kill his wife. He was placed in a dementia unit, where he subsequently assaulted other residents. He was treated with Risperidone, Donepezil, and Escitalopram.

Case 4
A married man who was a professional heavyweight boxer for more than 20 years. He was knocked out once during his career. He was a non-drinker and non-smoker. At least a decade prior to presentation, he began to decline cognitively. At presentation, his ACE score was 39/100 and MMSE was 19/30.

Case 5
A married man who was a professional boxer in his youth. His mother suffered from dementia and his father from alcoholic dementia. He completed secondary school and worked in an administrative position. His medical history included impaired glucose tolerance and hypertension, and he was a heavy smoker and drinker. At presentation, his RUDAS score was 18/30 and FAB score was 8/18. He also had persecutory delusions.

Case 6
A married man who was initially an amateur boxer and then a professional boxer for over 11 years. He suffered no knockouts. He left school at the age of 14 and worked as a labourer. He was a heavy drinker and non-smoker, and had a medical history of type 2 diabetes mellitus and hyperlipidaemia. There was no family history of dementia. At presentation, his ACE score was 51/100. He also had persecutory delusions.

Case 7
A married man who was an amateur boxer and who also got involved in public bar fights when drunk. He attended primary school for five years and worked as a labourer. He was a heavy drinker and smoker, and had a medical history of hypertension. At presentation, he scored 12/30 on the Montreal Cognitive Assessment.

Case 8
A married man who was an amateur and then professional boxer. He “took many punches to the head” and retired in his fourth decade due to frequent headaches. There was no history of knockouts. He left school at age 15 and worked in a factory. He was a moderate to heavy drinker, non-smoker, and had a medical history of hypertension. At presentation, his RUDAS score was 20/30 and FAB score 11/18.

The salient characteristics of these eight cases are summarised in Table 1.

A ninth case, from whom we were unable to obtain consent for release of his medical and psychiatric history, presented with features similar to the above cases. Seven of the eight cases had neuroimaging (CT scan) performed and the results are summarised in Table 2.

### Table 1: Characteristics of eight Pacific boxers with early onset dementia.

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<thead>
<tr>
<th>Case number</th>
<th>1</th>
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*education: + indicates primary education only; ++ indicates secondary education (empty cells indicate information not collected or unavailable).
Discussion

Anthropological evidence from prehistoric Tongan burial mounds suggests that ritualised violence, in the form of fist-fighting, performed an important ceremonial function and also helped to “maintain important kinship relations by relieving stress and aggression”. Indeed, when Captain James Cook arrived in Tonga in 1777, he was royally entertained with boxing and wrestling exhibitions, involving both men and women. David Samwell, who was surgeon on the boat *Discovery*, which accompanied Cook’s boat *Resolution* on the third voyage, described in excellent detail the manner in which the Tongans boxed and notes how “these Exercises are held in great Esteem among them, the Children are brought up in the Practice of them from their Infancy, especially the Sons of the Chiefs…”

Following the post-war wave of Pacific immigration to New Zealand, Samoan and Tongan boxers dominated the local boxing scene, winning many national titles during the 1950s and 1960s, and acting as role models for the cohort of cases described in our series. Their dominance continues to this day: between 2009 and 2013, four out of five New Zealand amateur title holders in the heavyweight and super heavyweight divisions were of Pacific descent; at the 2007 Pacific Games held in Apia, 6 out of 11 gold medals in men’s boxing were won by Samoans. These snapshots over the course of centuries suggest that boxing may have been and may continue to be an important part of some Pacific subcultures and male identity development. A Pacific man, known to the authors of this paper, reports that, on returning as a child to his mother’s village in the islands, he was invited to box against the leading boy of the village before he could be accepted into the local peer group. Instead, he decided to take flight rather than submit his developing brain to the onslaughts of his older opponent (anonymous, 2015 personal communication). It could be argued that this is nothing unusual, and that boys everywhere use fighting to establish pecking orders and resolve disputes. This has been referred to as the ‘predacious interval’ in male development. The length of the predacious interval, however, is culturally determined, extending it or channeling it into acceptable forms, such as boxing. It is interesting to note that the COMPASS study (Combating Obesity in Māori and Pasifika Adolescent School-Children Study) included non-contact boxing training as its culturally-appropriate exercise paradigm. It is, of course, important to avoid the assumption that Pacific culture is a unitary concept. Indeed, the cases in this series are from Samoa and Tonga only, which suggests that the term ‘Pacific’ or ‘Pasifika’ may be too broad and homogenous a label for the cultural phenomenon we are describing.

Table 2: Brain CT scan characteristics of seven Pacific boxers with early onset dementia.

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<th>Case</th>
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<td>CTE changes</td>
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+ = mild; ++ = moderate; +++ = severe; SVID = small vessel ischaemic disease; VD = ventricular dilatation; CT = callosal thinning; CSP = cavum septum pellucidum.
In addition to cultural-historical factors, there are social and economic factors that determine a particular sport’s attraction to young people. Boxing subcultures flourish in urban centers in which ethnic minorities are over-represented. Boxers often tend to be the children of first generation immigrants, who have not yet established themselves financially in a new country. As successive waves of immigrants entered the US, for example, boxers often came from those ethnic groups at the bottom of the socio-economic ladder. As these ethnic groups improved their lot in life, the attraction to a sport like boxing diminished. Seven of the cases reported in our series lived in either Otara or Mangere, which are the two localities in Counties Manukau with the lowest incomes. The percentage of adults in these two localities with incomes less than $20,000 per annum are 52% and 49% respectively.

The idea of boxing one’s way out of poverty might, however, be an oversimplification of the sport’s attraction to young men. The disciplining rhythms of training provide young men with a sense of purpose and work-ethic, and an acceptable avenue for asserting one’s emerging masculinity. Joining a boxing club provides a safer option than joining a gang. Many young men are also attracted to the sport in their early teens simply to have a good time, to become fit, to travel to tournaments and hopefully win titles. They do not necessarily see it as a profession and it is only those with talent who are later groomed for more serious careers.

The neuropsychiatric consequences of boxing have been well known in the medical literature since descriptions of the ‘punch-drunk’ syndrome by the pathologist Harrison S. Martland in 1928 and ‘dementia pugilistica’ by Millspaugh in 1937. These consequences occur in 10–20% of professional boxers and consist of motor symptoms, such as Parkinsonism, dysarthria, ataxia and spasticity; cognitive symptoms, such as amnesia; and emotional or behavioural symptoms, such as depression, irritability, aggression and addiction. Risk factors for dementia pugilistica include older age, longer duration of career, number of fights, frequent knockouts, lengthy sparring sessions, “good staying power” and carriers of the apolipoprotein E4 (APOE4) genotype. Amateur boxers fighting under Olympic-style rules, which provide stricter protective measures, are at less risk than professional boxers.

With the more recent observations that similar consequences can be seen in athletes from other body contact sports, such as football, ice hockey and wrestling, the term Chronic Traumatic Encephalopathy (CTE) is now used to encompass the syndrome and the pathological changes seen in athletes who have suffered repetitive traumatic brain injuries. Until recently, boxers suffering from the clinical changes seen in CTE were diagnosed with Alzheimer’s disease, but it is becoming clearer that the brain in CTE has pathological changes which are distinct from, though overlapping to some extent with, Alzheimer’s disease. These changes are well described elsewhere and include atrophy, especially of the frontal, temporal and cerebellar lobes, cavum septum pellicudum, ventricular dilatation and callosal thinning. Cavum septum pellicudum can be a normal variant and is seen reasonably frequently in asymptomatic subjects with normal scans. In our series, 3/7 had focal atrophy, 3/7 had cavum septum pellicudum, 4/7 had ventricular dilatation and 1/7 had callosal thinning.

In the cases that we describe above, it is more than likely that the cause of the early onset dementia was mixed. Seven of the eight cases described drank alcohol heavily and five had one or more vascular risk factors. On neuroimaging, seven cases had changes consistent with CTE, five had cerebellar atrophy or focal frontal atrophy possibly secondary to alcohol and three had ischaemic changes. This combination of alcohol, cerebrovascular risk factors and boxing-related repetitive head injury has been noted elsewhere in the boxing-dementia literature, and describes a stereotypic constellation of behavioral and lifestyle choices in subcultural groups, placing them at higher risk of early onset dementia. A prospective study following Pacific boxers and matched controls over a 30-year period, starting at the beginning of their boxing careers and continuing through to middle age, would be useful to establish a causal link between boxing and early onset dementia.

Three of our eight patients suffered from delusions of infidelity. All three of these also drank heavily, a well-known risk factor
for pathological jealousy. Our findings replicate those of Johnson, who found that 5 of 17 ex-boxers in his case series had delusions of infidelity.18

Pacific peoples living in New Zealand are at risk of early onset dementia for a number of reasons. In the period between 1982 and 2002, stroke incidence increased in New Zealand Pacific peoples by 21%.19 This compared with a decline by 19% in stroke incidence among New Zealand Europeans during the same period. New Zealand Pacific peoples have a mean age of onset of stroke of 65 years compared to 76 years in New Zealand Europeans, and they also have higher prevalence rates and earlier onset of diabetes, poorer glycaemic control and higher rates of diabetes-related complications.20 In addition, 62% of New Zealand Pacific peoples are obese and 26% smoke.21 Other risk factors for dementia, such as hazardous drinking patterns, lower levels of education and depression, also occur at higher rates in Pacific New Zealanders than in their European counterparts.22–24

For the reasons above, it is reasonable to hypothesise that New Zealand Pacific peoples might have earlier onset of dementia compared to New Zealand Europeans. Currently, there is no dementia prevalence data in New Zealand to confirm this. There are also no genetic data concerning APOE4 status among Pacific populations.

Boxers of Pacific origin living in New Zealand may therefore be at additional risk of developing early onset dementia. It would be important for such individuals to be fully informed about such risk before embarking on a boxing career. It would also be wise for such individuals to ascertain their APOE4 status at the beginning of their careers, as heterozygosity and homozygosity for this isoform increases the risk of developing Alzheimer’s disease by factors of 3 and 12 respectively.25

To conclude, this study highlights a series of Samoan and Tongan men in South Auckland with a history of amateur or professional boxing who have presented to our service with early onset dementia. A history of boxing is superimposed on other risk factors, such as alcohol and vascular disease, suggesting a multifactorial cause for their dementia. Historical, cultural and socio-economic factors appear to underlie the attraction of some Pacific men to boxing as a sport. We encourage sports physicians to inform young New Zealand Pacific boxers of the long-term risks associated with their sport.
REFERENCES:


