PAPERS AND ORIGINALS

Cryptogenic Drop Attacks: An Affliction of Women

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"I've often seen women fall; it doesn't seem to happen to men."—
Case No. 39.

Summary

A drop attack was defined as falling without warning, not apparently due to any malfunction of the legs, not induced by change of posture or movement of the head, and not accompanied by vertigo or other cephalic sensation. All 33 patients attending a neurological clinic with a primary complaint fulfilling these criteria were women, and a further seven examples were found by questioning 200 consecutive patients at a gynaecological clinic. No affected male was found.

In all but one patient, falls occurred only when walking. They were not due to wearing high-heeled shoes. The average age at onset was 44.5 years and in younger women onset was often during pregnancy. The accepted causes of drop attacks were not found with certainty in any of these patients. The sex incidence and the circumstances of the falls suggest that the cause may lie in differences between the two sexes in the mechanism of walking rather than in any central disturbance. Drop attacks in women commonly occur as an isolated symptom for many years, and although distressing have no serious prognostic implications.

Introduction

Falling to the ground without immediately discernible reason has been ascribed to many causes—such as, atherosclerotic ver-

tebrobasilar insufficiency (Williams and Wilson, 1962; Kubala and Millikan, 1964), cervical spondylosis with constriction of the vertebral artery (Sheehan *et al.*, 1960), tumours in the region of the foramen magnum (Kremer, 1958), colloid cyst of the third ventricle (Kelly, 1951), menopausal muscular dystrophy (Shy and McEachern, 1951), congenital heart disease (Evans and Bremner, 1961), myxoedema (Jellinek, 1962), vestibular disease (J. N. Blau, personal communication, 1972), progressive supranuclear palsy, (Steele *et al.*, 1964), old age (Sheldon, 1960), epilepsy (Lennox and Lennox, 1960), and subconscious guilt (Leuba, 1950). Nevertheless, as Kremer (1958) pointed out, such falls usually remain unexplained. One of us (Matthews, 1963) claimed that patients subject to drop attacks are predominantly middle-aged women, and we now present the evidence for this statement.

Method

A drop attack was defined as falling without warning, not apparently due to any malfunction of the lower limbs, not induced by change of posture or movement of the head, and not accompanied by vertigo or other cephalic sensation. Attacks were accepted in which momentary loss of consciousness for the duration of the fall could not with certainty be excluded, but not attacks from which recovery was delayed by any factor other than the effects of injury sustained in the fall.

Patients were derived from two sources. From 1954 to 1966 a total of 54 patients were indexed as having attended the neurological clinic at the Derbyshire Royal Infirmary with a primary or sole complaint of attacks of falling. This method of classification excluded, for example, patients who also complained of vertigo, difficulty in walking or balancing, myoclonic jerks, or loss of consciousness from any cause. Of these 54 patients, 21 were excluded either because information was inadequate or because the criteria of our definition of drop attacks were not fulfilled, leaving 33 accepted cases. Twelve further patients with a similar complaint were found as the result of a deliberate search. Of these, five were excluded for the reasons mentioned above and seven were accepted. Of the total of 40 accepted patients, 28 attended for follow-up examination and investigation, and more limited information was available on the remaining 12 patients.

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Results

SEX INCIDENCE

Of the 54 patients attending the clinic with a primary complaint of falling 51 were women. The three men were among those excluded from the series, two because their falls were manifestly due to weakness of the thigh muscles and the third, an elderly man on large doses of stilboestrol for prostatic carcinoma, because of insufficient information. All 33 accepted cases from the clinic were women.

We therefore asked 200 consecutive women attending a gynaecological clinic if they had experienced attacks of unexplained falling at any time in the past. Twelve had done so, and of these seven were accepted as having had drop attacks. We asked 100 consecutive men admitted for routine surgery the same question, and none had had symptoms resembling drop attacks. All 40 patients in the series were, therefore, women.

Eight of the 28 patients attending for follow-up gave a positive family history, again with exclusively female incidence. Five patients stated that one close female relative (mother, aunt, or sister) had suffered from attacks of falling, and two had two affected relatives. One patient said that her mother, maternal grandmother, one maternal and one paternal aunt had had such attacks. No systematic attempt was made to interview relatives. No patient was aware of a male affected relative.

AGE

The age at onset is shown in the table. The average was 44.5 years and in two-thirds of the patients the onset was between 40 and 59.

Age at Onset of Drop Attacks in 40 Women

Age at Onset	19	20-29	30-39	40-49	50-59	60-69
No. of Patients	1	7	2	14	13	3

THE FALLS

The characteristics of the falls were analysed in greater detail in 28 patients. By definition there was no warning and no precipitating factors could be recognized. Patients had no difficulty in recognizing that they had not tripped, although they often gave this explanation to onlookers to avoid looking ridiculous. Twenty-six patients always fell forwards, one would also occasionally fall into a sitting or supine position, and one always did so. Twenty-seven patients fell only while walking but one patient also occasionally fell while standing. Falling was much more apt to happen in the street than indoors, but 16 patients also sometimes fell in the house. Patients were often uncertain how to answer the question as to whether they lost consciousness, "because it is all over so quickly," but on detailed inquiry 16 were aware of striking the ground and 10 of these were also aware of falling. A further 10 patients extended the arms as if to break the fall. Two patients appeared neither to take any measures to avoid injury nor to be aware of falling, although both would rise immediately and continue walking. All those who fell forward sustained injuries to the knees and often to the hands, and in many falls the chest or face would also strike the ground. Three patients fractured a wrist in a fall, one sustained a broken nose, and one broke a rib. Injury sometimes prevented immediate recovery but so far as we could tell no patient was prevented from rising by disturbance of consciousness, vertigo, or paralysis.

The frequency of drop attacks could be assessed from the larger group of 40 patients. Two had a single fall; 16 had

two falls or less a year, although in three they had at first been much more frequent; 11 had between three and 12 a year; and six had more than 12 falls a year. Five patients had brief series of frequent falls with prolonged intervals of freedom.

These figures convey an inadequate impression of the effect of falling ludicrously, inexplicably, and painfully in a public place with resulting injuries and ruined clothing. Many women became afraid to go out, even when accompanied.

CAUSAL FACTORS

Possible causal or contributory factors peculiar to women were considered, and also more general possibilities including obesity, vascular disease, epilepsy, vestibular disease, myxoedema, and weakness of proximal muscles of the lower limbs.

The most immediately obvious possible cause of falling when walking occurring only in adult women is the distinctive footwear. Of 28 patients investigated, however, 24 were known to have fallen when wearing low-heeled shoes and five had fallen in bare feet. One patient had fallen only when wearing high heels. Footwear is clearly not a cause of drop attacks.

The association with hormonal changes was examined. Of the eight patients whose attacks began in the second and third decades five were pregnant at the time of onset. Falls were apt to occur early in pregnancy before abdominal distension was pronounced, but precise information was not available. In three of these patients drop attacks occurred in successive pregnancies and continued infrequently afterwards. One woman had a number of falls in a single pregnancy ending in miscarriage and occasional falls later. One patient had falls during two pregnancies, followed by remission and later return of symptoms after the menopause. No patient was found who had drop attacks only when pregnant. Three patients with drop attacks had never been pregnant.

Only one of 13 patients who were able to make the observation thought that her falls were related to the menstrual period. Despite the average age of onset the relation to the menopause was not close. Of the 40 women 10 were pre-menopausal when last seen. In six the onset was more than three years before the menopause, in 13 within three years before or after the menopause, and in 11 the onset was more than three years after. In less than half the patients could the onset be related either to pregnancy or to the menopause. Oral contraceptives were not available at the time of onset of drop attacks in most of these patients and were certainly not a causal factor.

OBESITY

No valid information was available on the incidence of obesity at the time of onset. At the time of follow-up 19 patients were still having drop attacks, and of these, seven were more than 10% above ideal weight, but two with identical symptoms were more than 10% below.

VASCULAR DISEASE

Of the 21 cases rejected from the 54 patients attending the clinic four were diagnosed on grounds other than their drop attacks as suffering from cerebral ischaemia. All of these would also have been excluded because their attacks were atypical, being accompanied by brief vertigo or induced by turning the head. Two further patients, who at the time of follow-up were aged 70 and 76, had recently developed transient cerebral ischaemic attacks and, at that time, had obvious

clinical evidence of arteriosclerosis, but were included in the series because they had experienced typical drop attacks without other symptoms from the ages of 52 and 49 respectively. The remaining patients had no symptoms suggestive of vertebrobasilar insufficiency. No patient in the group followed up had sustained a stroke, the average period of follow-up from the time of onset being 10 years, with a range of from 1 to 30 years. Those not followed up were last seen an average of three years after the onset of drop attacks (range < 1 to 11 years). Four of these patients were alive and well, although not willing to attend for further examination, two were known to have died of carcinoma of the breast, and six were not traced. No patient was known to have had a stroke.

Hypertension of 160/100 mm Hg at the time of first examination or on follow-up was found in five of the 40 patients, three of whom were over 60. No patient was found to have a blood pressure lower than 120/70 mm Hg on routine examination. In the 28 patients followed up no disorder of cardiac rhythm was detected. A carotid bruit was heard in two patients. An aortic systolic bruit was present in one, without clinical evidence of aortic stenosis.

The 28 patients followed up were examined with specific reference to clinical evidence of cervical spondylosis as a possible cause of vertebral artery constriction. In this age group we felt that little importance could be attached to radiological evidence of degenerative arthritis and a more notable finding was of three patients with repeated drop attacks and entirely normal radiographs of the cervical spine. Five patients had slight, and three more severe restriction of passive movement of the head. Three patients experienced dizziness, not amounting to vertigo, on full passive rotation or extension of the neck when examined sitting down, but we did not attempt to reproduce drop attacks by repeating this procedure with the patients standing.

EPILEPSY

In the rejected group there were two patients with undoubted epilepsy whose attacks of falling were atypical and proved to be a form of minor fit. One other patient was rejected because her presenting symptom was a nocturnal fit, although she had also suffered from typical drop attacks for many years. One patient was accepted because she presented with drop attacks beginning at the age of 45 but had had two major fits in the past. In no patient was there a history of petit mal or myoclonic jerks. Electroencephalography was performed in 24 of the 40 accepted patients. No "epileptic" discharges were found but minor abnormalities were present in four patients.

VESTIBULAR DISEASE

Standard caloric vestibular tests were performed in 23 patients, the only abnormality found being partial unilateral canal paresis in one patient.

PROXIMAL WEAKNESS

In the excluded group was one patient whose falls appeared to be due to the condition referred to as "menopausal muscular dystrophy" by Shy and McEachern (1951). The strength of the proximal muscles of the lower limbs was therefore stringently examined in all patients. Slight weakness of hip flexion was suspected in two patients, one of whom also had difficulty in rising from a low chair. She was obese and had experienced drop attacks since the onset in pregnancy 25 years earlier. We concluded that the series did not include any

example of clinically significant weakness of the pelvic girdle. The possibility that falling might be because of delay in the stretch reflex in the quadriceps was examined by recording the latency of the knee jerk in seven patients. The mean latency was 24.3 msec, a normal figure.

MYXOEDEMA

One patient was found on first attendance to have clinically mild myxoedema, confirmed on investigation. She was included in the series because typical drop attacks had occurred infrequently for 10 years. There was no clinical evidence of myopathy or cerebellar ataxia. When last seen, seven months after beginning treatment with thyroxine, she had not fallen again but this interval of freedom was not unusual. The protein bound iodine was estimated in a further six patients in whom myxoedema was thought to be clinically possible, but with normal results.

ASSOCIATED ABNORMALITIES

Of the 40 patients, four had suffered from migraine and two had severe headaches of less specific character. Both were eventually investigated by pneumoencephalography with normal results. Three had the carpal tunnel syndrome. Two had tonic pupillary reactions and one of these had absent tendon reflexes in the legs.

TREATMENT AND PROGNOSIS

Many patients had been treated intermittently with anti-convulsant drugs, probably without benefit. Oestrogens were given to a number of postmenopausal patients in the dosage usually used in the treatment of hot flushes. An initial impression of benefit was formed but could not be substantiated.

Of the 28 patients followed up, two had had a single fall. Of the remaining 26, 19 were regarded as still affected in that less than a year had elapsed since the last drop attack. In four patients falls had been occurring for over 20 years, in three for between 11 and 20 years, and in 12 for from 1 to 10 years. In the seven patients who had been free of drop attacks for over a year symptoms had previously persisted for from 1 to 19 years. No distinctive features could be detected in these patients who had recovered.

Discussion

This investigation has delineated a condition of attacks of falling as an isolated symptom occurring exclusively in women, usually in middle age but sometimes beginning earlier, particularly during pregnancy. In those attending hospital with this specific complaint drop attacks may persist infrequently for many years, although complete remission can occur. Our inquiry among patients attending a gynaecological clinic suggests that drop attacks are common, affecting at least 3.5% of adult women. Medical advice may not be sought, and we formed the impression that falling is often accepted as part of woman's lot. The falls can be distressing and frightening but do not have the serious prognostic implications of the causes usually ascribed to them in textbooks.

We did not discover why our patients fell. It would not be difficult to extend the list of possible causes given above or to suggest affinities with syncope or cataplexy. In this series, however, it is most improbable that any patient had a tumour

in the foramen magnum or third ventricle. We would certainly have identified drop attacks as part of the petit mal triad and there is nothing to suggest that falling in middle-aged women is a different distinctive presentation of epilepsy. One patient had myxoedema but this was excluded in all other patients in whom this diagnosis might even be considered. Mild vestibular dysfunction was found in a single patient. Cervical spondylosis constricting the vertebral arteries cannot be seriously entertained because drop attacks induced by turning the head were excluded. Syncope from any cause and cataplexy can be ruled out on clinical grounds.

Of the accepted causes there remains to be considered the most often cited—transient ischaemia of the brain stem resulting from occlusive vascular disease. There is no doubt that attacks of falling form part of the syndrome of vertebro-basilar insufficiency. Kameyama (1965) found that 63% of patients who had had drop attacks at some point in their clinical course had severe vertebrobasilar atherosclerosis at necropsy. Most of these patients had, however, also suffered from vertigo and other evidence of brain-stem ischaemia and would not have been included in the present series, nor are their drop attacks described. Of this entire series of 564 necropsies in elderly patients 66% had severe atherosclerosis at one or more sites.

Williams and Wilson (1962) stated that drop attacks occurred in nine of their patients diagnosed as having basilar insufficiency, but in those described the attacks were accompanied by other transient or persistent symptoms and would not have been included in the present series. Kubala and Millikan (1964) drew their cases exclusively from 373 patients indexed as having vertebrobasilar insufficiency, of whom 29 had drop attacks. The age of onset was much later than in our patients and more men than women were affected. The four cases described in detail differ in many respects from those in the present series. Two patients had warning of their attacks, one was ataxic, one was unable to rise after a fall, attacks were induced by change of head posture in two, and were found to be due to postural hypotension in a third. Lund's (1963) seven patients were all female. Of those described, two had Parkinson's disease and one, who was shown to have basilar stenosis, had a hemianopia. In two patients no cause could be found. The patient described by Klee and Mordhorst (1961), who had many symptoms of basilar insufficiency from the age of 29, had attacks of falling early in the course of her long history. She was described as becoming so weak that she fell—a description not used by our patients. Sheldon (1960) described falling in the elderly without mentioning the sex incidence. In many of his patients the legs were paralysed for a variable period, perhaps because of ischaemia of the spinal cord.

In the present patients we naturally cannot exclude transient cerebral ischaemia, but occlusive vascular disease is an unconvincing cause for such brief events, unaccompanied by other symptoms, often recurring for a decade or more and affecting only women. Postural hypotension was not specifically excluded in our patients and some autonomic dysfunction must be presumed in the two women with tonic pupils. Patients who fall because of orthostatic hypotension, however, are nearly always able to relate their symptoms either to a change in posture or to prolonged standing, and complain of giddiness and faintness before falling, usually with loss of consciousness.

There is no reason to suppose that the remarkable sex incidence was due to bias in the method of indexing, and the female preponderance was supported by our inquiries among patients with unrelated symptoms. The same sex incidence was noted by Leuba (1950). His attribution of the falls to extinction of the ego by the intrusion of a forbidden erotic thought, an aspect that we did not investigate, should not obscure his astute clinical observations. Kremer (1958) wrote of the patient with idiopathic drop attacks in the feminine gender but gave no figures. We found some evidence linking the onset with pregnancy and the menopause, particularly the former, but the association was not exclusive and an unspecified attribution to "hormonal influences" scarcely advances the discussion.

All but one of our patients fell only when walking. It is a matter of everyday observation that women walk differently from men but quantitative information is scanty. When standing women tend to sway more than men and this difference is accentuated with increasing age and weight (Stevens and Tomlinson, 1971, 1972), but there is no similar information on the distribution of the centre of gravity during walking. Battye and Joseph (1966) described minor differences between the sexes in the distribution of muscular activity during the walking cycle but their findings have no obvious relevance. The unheralded and comprehensive nature of the falls need not imply central failure to maintain the muscular activity necessary for the upright posture, as the unpleasant childish trick of a sharp tap behind the braced knee can result in falling in the unwary and is unlikely to involve the reticular formation. It is, after all, difficult to fall slowly, and equally catastrophic falling is a well recognized symptom of weakness of the quadriceps. It is more inherently probable that appreciable differences between the sexes exist at a level more peripheral than the brain stem, and investigation of such aspects might elucidate the common and relatively neglected condition of drop attacks in women.

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