

Dupuytren's contracture in manual workers

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ABSTRACT The incidence of Dupuytren's contracture in a polyvinyl chloride (PVC) manufacturing plant, where a great deal of bagging and packing took place by hand, was higher than that in another plant in which there was no bagging or packing. The incidence in the packing plant was double that found in an earlier survey by Early at Crewe Locomotive Works of 4801 individuals, most of whom were manual workers. The implication is that the nature of the work of bagging and packing in our PVC compounding plant may have triggered Dupuytren's contracture.

In 1832 Dupuytren¹ first described a nodular proliferation of fibrous tissue of the palmar fascia, leading to contracture with permanent flexion of the fingers (especially the fourth and fifth), of one or both hands. This contracture, which has been named after him, was thought by Dupuytren to be caused, at least in part, by chronic occupational injury. Herzog² in 1951 found no evidence of such a relationship and many other authors support his observations.³⁻¹¹ Although some^{8,12} have found a lower incidence of Dupuytren's contracture in manual workers, others¹³⁻¹⁷ agree with Dupuytren that trauma may bring about the condition in predisposed individuals.

Microruptures observed in the palmar fascia have been attributed to multiple injuries aggravated by hard work,¹⁸ and some authors are of the opinion that Dupuytren's contracture may result from a single injury.¹⁹⁻²² A higher incidence of Dupuytren's contracture has been reported among epileptic patients^{6,8,9,15,18,23,24} and in patients with diabetes mellitus,²⁵ but these considerations did not apply to the study population, which consisted of a healthy work force.

At Hillhouse Works large quantities of polyvinyl chloride (PVC) are manufactured by the polymerisation of vinyl chloride monomer. The hazards associated with vinyl chloride monomer, including angiosarcoma of the liver, acro-osteolysis, Raynaud's phenomenon, and scleroderma are now well known.²⁶⁻³⁰ Our interest in Dupuytren's contracture was aroused when one of the workers, a bagger and packer in the PVC plant, attended the medical centre for treatment and was noticed incidentally to have this condition. He mentioned that some of his

fellow workers were similarly affected. We therefore decided to investigate the incidence of Dupuytren's contracture in workers engaged in the bagging and packing of PVC.

Process

The bagging and packing process was formerly carried out as follows. PVC compound was packed into 25-kg sacks on a semi-automatic packing line. (These sacks were made of 3-ply paper and measured roughly 810 mm × 460 mm, with a 100-mm gusset. The base was capped and sewn, and the mouth was open with fine serrated edges.) The open mouth was placed over the filling point, held in place with clamps, and the bag was automatically filled and then dropped from the filling point. A worker grasped the top of the sack at each side and pressed the gussets together. He pulled the top of the sack taut and directed the leading edge into and through the stitcher guide, keeping the top taut and vertical. The stitched bags were then transferred by hand several yards to a palletiser. In a recent modification of the process the sacks, after automatic filling, drop off the filling point on to a conveyor and thence to a stitching machine; the stitched bags are transferred by conveyor to the palletiser thus making manual work unnecessary.

Methods

The entire population of 216 male workers in the bagging and packing plant was studied; 84 male workers in another plant in which no bagging or packing took place were taken as a control population. A questionnaire was used to record each man's name, date of birth, present occupation (including the starting date), and his occupational history. In

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addition, the history of past illnesses, injuries, alcohol and tobacco intake, and any past or present medical treatment were noted. The family history, with especial reference to Dupuytren's contracture, was also recorded as were details of the types of tools used, together with chemicals or other objects handled throughout the working career, and the frequency of their use. The questionnaire was completed by the same person in each case to reduce the risk of observer error.

An inspection was made of each man's hands to detect evidence of Dupuytren's contracture. In any positive cases the severity was assessed on both an anatomical and a functional basis, noting the degree of contracture where present using the scheme described by Early.⁴ The position of any nodules was noted on a chart of an anatomical drawing of the hands.

Results

Of the 216 men in the bagging and packing plant, 16 (7.4%) had the condition described by Dupuytren: of these, nine had at least one nodule but no contracture (56.2%), five had minimal contracture (31.2%), one moderate contracture (6.2%), and one severe contracture (6.2%). In the control population one case only was discovered; this man having nodules without contracture. There were no differences between the groups with respect to medical or family histories.

The data were analysed using the figures obtained from subjects at Crewe Locomotive Works,⁴ who comprised 4374 manual workers engaged in light to heavy manual work, and 427 office workers (of which 301 were women): no significant difference in the overall frequency of Dupuytren's contracture was found between these two groups, being 3.3% and 4% respectively. These figures were used as index data for the calculation of age-adjusted standardised morbidity ratios (SMR)* for workers in both our plants (table). The observed and expected figures for the bagging and packing plant were 16 and 8.08 respectively (SMR = 198); those for the men in the control plant were 1 and 2.37 respectively (SMR = 42). The probability of observing 16 or more cases in the population of the first plant is 0.009, and the probability of observing one or fewer cases in the control population is 0.32. The results from the first plant are therefore unlikely to have arisen by chance, whereas the figure for the control population is consistent with the background incidence. Early's data⁴ relate to the prevalence of Dupuytren's contracture. In this study most men with positive

*The SMR is defined as the ratio of the observed to the expected numbers of cases multiplied by 100.

Age-specific data for Dupuytren's contracture (cases/total)

Plant	Age (years)					Total
	15-24	25-34	35-44	45-54	55-64	
Plant entailing bagging & packing (n = 216)	0/19	1/33	3/55	4/64	8/45	16/216
Control (n = 84)	0/10	0/21	0/16	1/28	0/9	1/84
Crewe Loco (n = 4801)	1/944	2/969	12/980	43/982	93/926	151/4801

findings had not advanced to the stage of developing contracture but were at the earlier stage of fascial thickening and nodulation.

It is proposed to follow up the study group to assess whether the men with nodules only develop contractures.

Discussion

The incidence of Dupuytren's contracture in male workers concerned bagging and packing in this study is considerably higher than that in the control group, and is double the prevalence found in Early's survey of 4801 individuals at the Crewe Locomotive Works.⁴ This supports the view that the prevalence of Dupuytren's contracture in our plant has been affected by the particular type of work, involving continual handling of 25-kg sacks. I believe the handling, grasping, and lifting of 25-kg sacks over a long period has produced low-grade micro-trauma to the palmar fascia, leading to an increased incidence of Dupuytren's contracture.

Of the subjects with Dupuytren's contracture, 56.2% had nodules only, with no actual contracture. In only one case was the condition severe enough to warrant surgical consideration.

After the survey had started the bagging and packing process was made fully automatic, thus preventing further damage to the hands. It is proposed to inspect the workers' hands regularly to assess the progress of the condition.

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*The SMR is defined as the ratio of the observed to the expected numbers of cases multiplied by 100.

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