CARCINOMA OF THE SKIN IN MACHINE TOOL SETTERS

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Two cases of extensive squamous carcinoma of the scrotum are described in men who were working together as capstan lathe setters in the same workshop. The incidence of cancer of the skin is discussed with special reference to workers outside the cotton industry, and the importance of periodic medical examination of persons in contact with mineral oil is emphasized.

For many years it has been known that carcinoma of the skin occurs through prolonged contact with mineral oils, and on January 1, 1920, this disease was added to the list of notifiable diseases under the Factories Acts. In 1930 statutory recognition was given to the disease for compensation purposes, and it is now one of the Prescribed Diseases (No. 23 (c)) under the National Insurance (Industrial Injuries) Acts.

Cruickshank and Squire (1950) reported the results of their research into skin cancer in the engineering industry arising from the use of mineral oil. They described hyperkeratotic lesions on the arms of 60% of workers exposed to mineral oils for more than 15 years, and carried out biological tests which showed that a sample of cutting oil produced a benign tumour in rabbits.

Six cases of squamous-cell carcinoma in machine tool workers in one plant were reported by Mastromatteo (1955), and an experimental study of the carcinogenicity of cutting oils was carried out by Gilman and Vesselinovitch (1955).

The two cases of squamous epithelioma described in this paper were notified in 1961 and occurred in capstan tool setters from the same large engineering works.

Investigation of Working Conditions

The two men were working together in the same machine shop and were personal friends. The machine shop was large and contained many rows of machine tools, mostly capstan lathes. Over 200 people (men and women) worked in the shop.

Examination of the lathes showed that large amounts of cutting oils and coolants were used, and were sprayed from the work on to the workers'

clothes, especially in high speed operations. In some cases attempts had been made to fit splash guards, but these were not used consistently. Neoprene aprons were provided and most of the women were wearing them, but the men were wearing their own clothes which, in most cases, were soaked with oil.

The oils were of a type in common use in industry; one was mixed with 20 parts of water to one of oil, and the other was used undiluted.

Case Reports

Case 1.—Male, aged 48 years (born December 18, 1912), had been a capstan lathe setter in the same factory since 1948, and had been a lathe worker or machine tool operator in various other engineering firms from 1930 to 1948.

Over his ordinary clothes, he wore a boiler suit which he changed weekly, and he did not wear the apron provided.

Medical History.—In 1946 a wart appeared on his scrotum. He removed the wart with a patent ointment.

Early in 1960 he noticed a "sore" under his scrotum on the site of the previous wart. Six months later this began to bleed, and in August 1960 he noticed that the glands in his groin were enlarged, but was too embarrassed to see his doctor. The "sore" was 2 in. in diameter.

In January 1961 he consulted his general practitioner who referred him to the Liverpool Royal Infirmary where he was operated on by Mr. Helsby in February 1961. The scrotum, left testicle, and inguinal glands were removed from both groins. Skin grafting was needed to assist healing.

The pathological report showed a keratinizing squamous carcinoma of the scrotum.

In July 1961 examination revealed some oedema of the lower abdominal wall and upper thighs. There were no signs of any hyperkeratosis on the arms or elsewhere on the body.

TABLE 1

NUMBERS OF CASES OF SKIN CANCER NOTIFIED TO H.M. CHIEF INSPECTOR OF FACTORIES, 1944 TO 1959

Year	Total		Due to Tar and Pitch		Due to Mineral Oil			
	No. of Cases	Deaths	No. of Cases	Deaths	Cotton Industry		Other Industries	
					No. of Cases	Deaths	No. of Cases	Deaths
1944	205	20	160	3	43	17	2	—
1945	215	9	176	1	39	8	—	—
1946	245	32	201	4	38	25	6	3
1947	203	15	173	5	25	9	5	1
1948	233	18	199	6	32	12	2	—
1949	190	13	162	3	26	10	2	—
1950	195	13	167	5	22	8	6	—
1951	178	1	159	—	13	1	6	—
1952	157	2	121	1	32	1	4	—
1953	256	70	196	26	57	43	3	1
1954	173	12	143	3	23	6	7	3
1955	211	18	163	5	40	11	8	2
1956	199	23	154	12	36	8	9	3
1957	197	12	172	9	21	1	4	2
1958	176	16	136	3	24	6	16	7
1959	226	9	190	—	20	4	16	5

TABLE 2

BODY DISTRIBUTION OF SKIN CANCER DUE TO MINERAL OIL IN INDUSTRIES OTHER THAN COTTON, 1950 TO 1959

Year	Total		Scrotum		Leg		Hands and Arms		Face	
	No. of Cases	Deaths	No. of Cases	Deaths	No. of Cases	Deaths	No. of Cases	Deaths	No. of Cases	Deaths
1950	6	—	3	—	—	—	3	—	—	—
1951	6	—	4	—	—	—	—	—	2	—
1952	4	—	3	—	—	—	1	—	—	—
1953	3	1	1	1	—	—	2	—	—	—
1954	7	3	6	2	1	1	—	—	—	—
1955	8	2	4	2	—	—	4	—	—	—
1956	9	3	5	2	—	—	3	—	1	1
1957	4	2	3	2	—	—	—	—	1	—
1958	16	7	11	7	—	—	5	—	—	—
1959	16	5	10	4	—	—	4	1	2	—
Totals	79	23	50	20	1	1	22	1	6	1

Case 2.—A male, aged 52 years (born January 5, 1909), had been a capstan lathe setter in the same factory for 20 years. He started work as a linotype apprentice in 1923, but then worked as a machine tool operator from 1925 to 1930 and 1939 to 1940 in other factories.

He did not regularly wear the apron provided but washed his working clothes at home once a week.

Medical History.—He noticed an irritation of his groin and crutch early in 1960 but was too shy to report this to his own doctor (a woman). He treated it with a patent ointment.

In April 1961 he noticed a warty swelling at the back of the scrotum, 3 in. in diameter, which ulcerated. He was admitted to Liverpool Royal Infirmary where he was operated on by Mr. Brewer who removed the scrotum and testes *in toto* on June 2, 1961. The inguinal glands were not removed. Pathological examination showed a squamous carcinoma.

On examination in July 1961 it was noticed that he had hyperkeratotic patches on the back of his right forearm.

Incidence of Skin Cancer Due to Mineral Oils

Examination of the statistics reveals an increasing number of cases of skin carcinoma due to mineral oils associated with work other than the cotton

industry, by far the most frequent occupation being that of machine tool setter or operator. It also shows the large proportion of fatal cases compared with skin cancer due to pitch and tar. The scrotum is the commonest site, and details of the 54 cases notified between 1920 and 1943 are given in Henry's classic "Carcinoma of the Scrotum in Relation to Occupation" (Henry, 1946).

The number of cases of skin cancer notified to H.M. Chief Inspector of Factories from 1944 to 1959 is shown in Table 1. The large number of fatal cases in 1953 includes several cases from previous years revealed by examination of the Registrar-General's records.

The body distribution of the cases of skin cancer due to mineral oils in occupations other than the cotton industry from 1950 to 1959 is given in Table 2. This shows the preponderance of scrotal cases.

The occupations of the cases of skin cancer occurring outside the cotton industry are shown in Table 3. Clinical details of many of the cases are given in the Annual Reports of H.M. Chief Inspector of Factories.

TABLE 3
OCCUPATIONS OF CASES IN TABLE 2

Occupation	No. of Cases	Deaths
Machine tool setters and operators	57	15
Jute workers	4	1
Oil converters	3	—
Shale oil stillmen	2	—
Other occupations (one case each)*	13	7

*Labourer, chain assembler, boiler (coke-fired), and oil lubricator attendant; power press operator; carriage and wagon examiner; carburetted water gas operator; cleaner and oiler in card-room; cooper and drum repairer; metal turner; gear cutter; wire drawer; burning, rivetting, and drilling in ships and boilers; rolling mill operator.

Discussion

Details of the early employment history could not be obtained more accurately. The induction time in Case 1 was probably about 30 years, assuming that the wart in 1946 was non-malignant, and in Case 2 about 36 years.

The tragedy of the two cases described in this paper is that both men were working with a known carcinogen and that, owing to personal reticence, neither of them consulted a doctor until the condition had been present for over a year. By this time the disease had progressed so far that a severe mutilating operation was necessary. Both cases had used self-medication with a patent ointment, a practice which should be wholeheartedly condemned.

Periodic medical examination, if undertaken with sufficient frequency, would have revealed the disease in an early stage when treatment would have been simple and might have resulted in a complete cure. The ultimate prognosis in the two cases reported is not good. No legal action has been taken in these cases.

Senior executives and works' managers in the engineering industry generally and the men on the shop floor do not seem to be aware, on the whole, of the possibility that cutting oils may cause cancer. In the cotton industry "mule spinners' cancer" is well known, and precautions are taken accordingly; the use of a non-carcinogenic oil is obligatory under The Mule Spinning (Health) Special Regulations, 1953. There is a compulsory periodic medical examination for mule spinners, and voluntary examinations have been instituted in other industries such as tar distilleries.

There was an increase in 1958 and 1959 in the numbers of cases of skin cancer due to mineral oil among machine tool setters and operators. The account of these two men, working side by side, who underwent mutilating operations draws attention to the need for preventive measures.

The working conditions in machine shops vary

greatly. In some factories the lathes are fitted with adequate well-designed splash guards, and the operators' clothes are only slightly soiled. In other shops the machines spray oil all round and the lathes and floors become covered in oil, with the result that the workers' clothes become soaked. High speed machines particularly need attention, for these use more oil and coolants which tend to be thrown off by centrifugal force.

Safety precautions should be directed to preventing the skin from remaining in contact with oil-soaked clothing. Machine tools can be designed so as to prevent oil spraying, but the setter has still to lean over the machine to make adjustments. Many factories supply clean overalls at a small cost to the employee. Where these schemes are in operation they have been widely used and appreciated by the employees. Oil-proof aprons are effective but are more awkward to use and may become caught in a machine.

Personal cleanliness, the supply of clean protective clothing, the design of efficient splash guards on machines, and the use of non-carcinogenic oils, are needed; but above all it is only by the periodic medical examination of all machine tool setters and operators that the number of severe and fatal cases of skin cancer can be reduced. Retired workers must not be forgotten, for the period of contact before cancer develops may often be over 30 years. In the factory concerned, voluntary periodic medical examinations of all machine tool workers have been instituted.

A useful summary of the problem is given in the leaflet "Effects on the Skin of Mineral Oil" issued free by the Ministry of Labour, H.M. Factory Inspectorate (Form 295), which is suitable for distribution to all people who are working in contact with mineral oil.

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