A Rare Fatal Head Injury and Crush Injury to Leg by an Improperly Assembled Chaff Cutter – a farm Machinery-Related Injury in North-West India: a Case Report

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ABSTRACT

Background: Chaff cutter, a commonly used fodder cutter machine in rural parts of India is responsible for a significant number of agricultural-related accidents. Mostly, these accidents lead to amputation of the upper extremities and the fatal injuries are extremely rare.

Case Report: This article presents a very unusual case of fatal head injury and crush injury to right leg sustained by a farmer while working with a self-assembled chaff cutter machine in his field. His leg caught between the belt and the wheel of the diesel engine when he tried to cross it and resulted in such kind of fatal injuries.

Conclusion: Despite existing rules regarding the quality norms for the farm machinery in India and the availability of high-quality, safe machinery in the market, self-assembled chaff cutters are still in use and are posing a risk to any person working around. Apart from explaining the mechanism of the fatal injuries, this paper also stresses mainly on the need for ensuring the use of government prescribed safe machines and conducting regular training programs for farmers regarding the safe handling of farm machinery to reduce these kinds of fatalities.

►*Implication for health policy/practice/research/medical education:* Fatal Head Injury and Crush Injury to Leg

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1. Introduction:

Agriculture, the backbone of India, is the largest source of income for many rural people. It is not surprising that the agricultural related accidents at the workplace and home are common among farmers as about 54.6% of the rural population of India is engaged in agriculture related activities (1). Most of these farmers are using traditional methods with limited resources for farming (2). During the period between 2004-07, a survey was conducted by Indian Council of Agricultural Research in collaboration with Indian Agricultural Statistics Research Institute, New Delhi regarding agricultural related accidents. This study took place in seven states across India.

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According to this survey, hand tools contributed 34.2% of accidents, and 30.5 % of farm accidents were due to machinery. Rest of the accidents (35.3%) was due other reasons like animal bites, snake bites, lightning, drowning, *etc*. (3). According to an another study, among the farm machinery accidents, chaff cutter (both manual and power operated) related accidents were 9.3% (4).

The farm machinery accidents are mainly due to improper handling, lack of safety precautions and poor standards followed by machine manufacturers. Farmers are using poor quality tractors, thresher, sprayer, dusters, sugarcane crusher and chaff-cutters which make them more prone to fatal accidents (5). As far as chaff cutter is concerned, in most of the cases, it caused injuries and amputation of extremities and deaths are very rarely reported (6). This paper reports a case of crush injury to an extremity and fatal head injury due to an improperly assembled chaff cutter. It also discusses the mechanism of injury and emphasizes the importance of adopting a new policy by the government to prevent such kind of fatal injuries among rural farmers/laborers.

2. Case Report:

A 35-year-old male, farmer by occupation, residing in a village of Punjab was admitted in Advance Trauma Centre, PGIMER, Chandigarh with an alleged history of machinery accident while working in the backyard of his home with chaff cutter on 11.05.16 at around 6 PM. He was a referral case from a community hospital and admitted in E1VTM1status with bilateral pupils fixed and dilated. As per the statement of his coworker, the deceased was trying to cross the long belt which connects the diesel engine and the chaff cutter his leg was accidentally entrapped by the belt and pulled into the wheel of the diesel engine, and he sustained injuries. Next day, in the morning, the patient succumbed to his injuries and postmortem was conducted after two days.

Autopsy Findings: On external examination, the deceased had a crush injury and partial traumatic below-knee amputation of right leg with multiple fractures of both bones of the leg and extensive damage to muscles, blood vessels, and nerves. (Fig 1A and 1B). Two lacerated wounds of sizes 2 cm X 1.5 cm and 7 cm X 1 cm, both are bone deep in nature, were noted over the right parieto temporal region. (Fig. 1C) On internal examination, sub-aponeurotic hemorrhage was found in the right temporo parieto occipital region of the scalp. Fissured fracture was noted in the right temporal bone with fracture line radiating over the floor of the right middle cranial fossa. There was subdural hemorrhage over the left cerebral hemisphere and brain was edematous. The cause of death, in this case, was given as craniocerebral damage consequent to blunt trauma to the head.

3. Discussion:

Agriculture related accidents are more common in North-West region of India, particularly in the state of Punjab and a majority of those accidents are due to farm machinery like tractors, harvesters, thresher and chaff cutter (70.7 %) (7). According to a survey conducted in Punjab during 2007-2012, the maximum numbers of farm machinery accidents are reported in district Sangrur (12.69%), and least in Nawanshar (1.53%) and Kapurthala (1.52%). Chaff cutter is the leading cause of the accident which contributed 68% of total machinery accidents (7). The present case is reported from Fathgarhsahib district of Punjab state. According to the survey mentioned above, this district contributed 3% of total machinery accidents in Punjab, and 70% of these accidents are due to chaff cutter (7). Chaff cutter is identified as a dangerous weapon by most of the researchers (8). The chaff cutter is used in almost each rural household in the Punjab state and on a daily basis the people use chaff cutter averagely at least for one hour (6). Accidents are more common during the harvesting season due to work overload and stress, and most of them are non-fatal and lead to amputation of extremities (7, 9). In India, the harvesting and threshing season last from the end of March to early June. These incidences are more common during early morning or

Fig. 1. A and B: Crush injury and partial traumatic below-knee amputation of right leg
Figure 1C: Two lacerated wounds over the right parieto-temporal region.

Fig. 2. A, B, C and D. Chaff cutter machine with a diesel engine at the accident site.
White arrow: Diesel engine
Curved white arrow: Chaff cutter machine
Black arrow: Belt connects Diesel engine with Chaff cutter machine
Black arrow head: Blood on ground
White arrow head : Chaff

evening time, as most of the work is done during this period (10). In the present case also the accident has occurred in the month of May 2016 at about 6 PM.

Chaff cutter consists of two parts; one portion contains the blade, inlet, and outlet, and another part is a diesel engine, and a belt connects these two parts. The harvested wheat or other agriculture chaff is introduced into the inlet, and the cutting blade cuts the chaff. The diesel engine gives the movement to the blade. In standard company made chaff cutters, blade, belt and diesel engine are fully covered which make this machine safe to use. In rural areas to cut the cost of the machinery, farmers are using locally made or self-assembled chaff cutters by connecting manual chaff cutters with some locally available old diesel engines. In those machines, the wheel of the diesel engine, belt, blades and other sharp objects are not covered and pose a threat to persons working on it. The inlet is responsible mainly for upper limb injuries while belt, pulley and diesel engine for lower limb injuries. As there is no gear to stop the machine immediately, it is very difficult to prevent the injury once a person is stuck in the machine. Amputation of upper extremities is commonly reported in chaff cutter related injuries. As most of these victims are bread earner of their families these accidents cause severe socio-economic burden and poverty.

In the present case, the deceased sustained crush injury with partial amputation of right leg and head injuries and he died of Craniocerebral trauma which is a rare occurrence and different from other chaff cutter injuries. After analyzing the history, pattern of injury and the crime scene photographs, the mechanism of injury is explained as follows. When the deceased tried to cross the belt, his left leg might have got entangled in the belt and pulled towards the wheel. Following this, he might have fallen and sustained head injuries. It clearly shows that the improper use of chaff cutter can cause fatal injuries.

4. Conclusion:

To prevent such agriculture related injuries, the Machinery should be serviced regularly, and the moving parts should be covered completely so that there should not be any openly placed sharp blades, wheels or belt. Farmers too should take responsibility to exercise all the possible precautionary methods while working on these machines and they should purchase a company-maid machine which has all safety measures to reduce the chance of injuries. The government should fix the strict quality norms for the farm machinery manufacturers. State government should arrange regular training programs, especially during the harvesting season and educate the farmers regarding the safety measures while handling the agricultural machinery. Government officials should visit the farmers regularly and ensure that there is no violation of prescribed standards in using farm machines. By taking these steps, farm machinery-related accidents can be reduced very well.

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