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Bicycle accident injuries

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Summary

Bicycle accidents in 210 patients are analysed. Ages ranged from 1 to 59 years (mean 14.5 years) with a male predominance. In 52% of patients there was a head or facial injury, 6% being moderate to severe. Of the fractures 64% involved the upper limb, 32% being of the radius and ulna and 22% of the clavicle. The majority of abrasions and soft-tissue injuries involved the limbs.

S Afr Med J 1986; **70**: 413-414.

Cycling is practised by young and old for exercise, transport and as a formal sporting activity, but the vulnerability of the cyclist is often underestimated.^{1,2} Injuries sustained in cycling accidents through error of judgement, environmental circumstances or negligence by other road users are reviewed. The impression gained while on duty in the Trauma Unit of Tygerberg Hospital, Cape Town, that these accidents were common, prompted this investigation.

Patients and methods

The trauma records for the period January 1984 - June 1985 were retrospectively reviewed. All white patients admitted with injuries sustained while cycling were included in the analysis. Patients certified dead on arrival at the hospital were excluded.

Factors assessed were age, sex, whether another vehicle was involved in the accident, the nature of the injuries sustained, the number of radiological investigations required, the number of

specialist consultations, and whether in-patient admission was required.

The injuries were classified as: skin lacerations, abrasions, soft tissue contusions, fractures, head injuries (skull and intracranial), dental injuries, and internal organ (other than the brain) injuries. The injuries were graded according to the Abbreviated Injury Scale (AIS) as accepted by the Joint Injuries Scaling Committee of the American Medical Association and the American Association for Automotive Medicine and based on Baker's Injury Severity Scale: grade 1 = minor, 2 = moderate, 3 = serious, 4 = severe, 5 = critical and 6 = non-survivable for each body area injured.^{2,3}

Results

In the period reviewed 210 cases were seen, with a maximum of 19 in any one month.

Age and sex

Three infants under 2 years of age were seen; all were passengers on bicycles. Ages ranged from 1 to 58 years (mean 14.5 ± 9.36 years) with 55% of patients being under 13 years of age. Eighty-one per cent were males and 19% were females.

TABLE I. AGE AT TIME OF ACCIDENT

Age (yrs)	No. of cases	% of total
1 - 5	25	11,9
6 - 10	40	19,1
11 - 15	91	43,3
15 - 20	26	12,4
21 - 58	28	13,3
Total	210	100

Type of accident

In 85% of the accidents only the cyclist was involved; in 15% there was a collision with another vehicle. In 13 patients the injuries were sustained by contact between the feet and the wheel spokes.

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Injuries

In all 398 injuries were documented — an average of 1.9 injuries per patient. No intra-abdominal or intrathoracic injuries were reported (Table II).

Fractures. Of the 68 fractures seen 22% were clavicular, 32% involved the radius or ulna or both and 13% were phalangeal. The remaining fractures involved the humerus, femur and tibia in equal proportions. One patient sustained compression fractures of three thoracic vertebrae.

Head injuries. There were 13 head injuries with neurological complications — 7 cases of concussion, 3 linear skull fractures, 2 subdural haemorrhages and 1 case of diffuse intracerebral haemorrhagic contusions and intraventricular haemorrhage. This was the only death in the series.

Dental injuries. There were 8 dental injuries, including loose, missing and broken teeth.

TABLE II. SOFT-TISSUE INJURIES

	No.	Face/ head (%)	Upper limb (%)	Lower limb (%)
Lacerations	85	56	11	33
Abrasions	150	23	44	33
Contusions	73	35	26	39

Referrals and investigation

Radiological investigation was required in 74% of cases. Consultations included: 35% orthopaedic, 6% neurosurgical, 4% dental and 1% plastic surgery. There was 1 death. The Injury Severity Score (ISS) (the sum of the square of the three highest AIS scores) was: 95% of cases had a score of less than 3 and 5% had a score of 3 or more.

Discussion

Most patients were in the 11-15-year-old age group. This was in keeping with the findings of other authors who have studied all age groups.^{1,2} In 173 fatal cases reported by Fife *et al.*³ the median age was 14 years. An alarming finding in this series was that 25 patients were under 5 years. Björnstig and Näslund² found during testing that children under the age of 8 years could not satisfactorily manoeuvre a bicycle. The Swedish Child Council recommends that children under 12 years should not ride a bicycle in traffic.²

Apart from the standard and racing bicycles, there are fashion trends — as evidenced by the 'high rise'⁴ types of the 1970s and the presently popular BMX.⁵ Retail outlets provide machines to suit all needs, including small models suitable for preschoolers. Should the use of bicycles on public roads not be controlled by legislation?

In this series there was a high proportion of males to females, which is similar to that reported elsewhere.^{1,3} Is this

because more males ride bicycles or are they less skilled cyclists?

Of the cases studied 85% did not involve a collision with another vehicle. However, in those cases in which there was a collision with another road user the injuries were usually more severe and the 1 death recorded occurred after such an accident. Fife *et al.*³ report that all deaths in their series were from injuries received in a collision with another vehicle. This is confirmed by Björnstig and Näslund.²

Although the face and scalp bore the brunt of the lacerations, abrasions and bruises, only a small percentage had moderate to severe skull and intracranial injuries. This high incidence of head injuries is confirmed in other series.^{1,2,6}

In 173 fatally injured cyclists recorded by Fife *et al.*,³ 86% had injuries to the head and neck regions, 6% had thoracic injuries, 6% had intra-abdominal injuries, and the most commonly encountered fractures were of the skull, lower limb, cervical vertebrae, ribs and pelvis. This contrasts with our findings of a higher incidence of upper limb fractures and no cervical spine injuries, reflecting the different mechanisms of injury in the two series.

Although motor vehicle designs have improved in recent years, e.g. sharp protuberances being eliminated and collapsible side mirrors being supplied, a car remains a heavy object with high kinetic energy which accounts for the serious injuries in such collisions.

Conclusion

Parents must be made aware of the fact that children under the age of 8 years cannot adequately control a bicycle and under the age of 12 years have insufficient road sense to use a public road. Perhaps there should be compulsory licences for bicycle riders? Road safety education and courses in bicycle skills should be introduced. All cyclists should avoid peak hour traffic and conditions of poor visibility (dawn, dusk, night, rain, etc.). Bicycle lanes or paths on main roads should be created where possible. As the head is most often injured, the wearing of helmets should be mandatory.

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