



Emergency surgery due to go-kart injuries: report of two consecutive cases

Go-kart yaralanmalarına bağlı acil cerrahi: Ardışık iki olgunun sunumu

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Injury due to go-karting accidents is a new kind of surgical emergency in Turkey and may show variations between patients. There are special details as relate to the design of the vehicles and patient characteristics. We report two seriously injured patients as a result of two different go-kart accidents. Severe intraabdominal hemorrhage due to liver laceration was seen in one patient and mesenteric intestinal avulsion in the other. Both patients were treated surgically and discharged uneventfully.

Key Words: Emergent surgery; go-kart; trauma.

Go-kart kazasına bağlı yaralanma Türkiye’de yeni bir acil cerrahi türüdür. Hastalara göre çok değişik şekillerde izlenebilirler. Araçların tasarımı ve hasta karakteristikleri arasında ince ayrıntılar vardır. Bu yazıda, iki farklı go-kart kazasında iki ciddi yaralanma olgusu sunuldu. Bu hastalarda karaciğer laserasyonu ve mezenterik intestinal avulsiyona bağlı şiddetli karın içi kanama izlendi. Hastalar cerrahi yöntemlerle tedavi edildi, problemsiz olarak taburcu edildiler.

Anahtar Sözcükler: Acil cerrahi; go-kart; travma.

The first kart was built by Kurtis Kraft in Southern California in 1956. The sport has rapidly spread to other Western countries. Recently, go-karting has become an attractive part of amusement parks in developing countries as well. It is gaining in popularity in Turkey, especially among the young population including teenagers.

Proctor and Miller^[1] first reported go-kart injuries from the United Kingdom in 1973. To date, there have been a limited number of reports about go-kart casualties in the literature.^[1-8]

We present herein two different cases admitted to the same hospital (a registered trauma center) within two days during a local holiday.

CASE REPORTS

Case 1- Over a long vacation, a 16-year-old male was admitted to the emergency department with abdominal pain due to a high-speed frontal collision to the tires near a race course while go-karting. He reported that he was driving a 9 hp go-kart at a speed

of 60 km/h and was wearing a helmet. He had generalized abdominal pain and tenderness and left ankle pain, with moving restriction. He was conscious, oriented and cooperative. Arterial blood pressure was 100/60 mmHg and pulse rate was 74 per minute. White blood count was 13,960/mm³, hematocrit 42.5% and hemoglobin 14.5 g/dl. Alanine transaminase was 193 U/L and aspartate transaminase was 242 U/L. Other hematologic and biochemical parameters were normal, but microscopic hematuria was determined on urine analysis. The plain X-ray films of cranium-neck, chest, abdomen, and extremities were normal. Ultrasound revealed minimal free liquid in the hepatorenal fossa and also in the pelvic region, with the deepest vertical height determined as 5 cm. No disintegration of parenchymatous organs was observed. Computed tomography could not be done because of the patient’s allergy history. The lesion on the ankle was evaluated as a soft tissue injury and conservative treatment was offered by an orthopedist. The urologist, neurosurgeon and thoracic surgeon reported normal examination findings. Exploratory laparotomy was decided to

determine the source of a possible hemorrhage. During the exploration under general anesthesia, approximately 300 ml of blood was aspirated and grade-1 liver laceration in segment 7-8 was observed. Hemostasis was obtained by surface suturing of the liver. He began oral feeding on the postoperative second day and abdominal drains were removed on the third day. Postoperative abdominal ultrasound revealed diffuse urinary bladder mucosal wall thickness. The urologist recommended conservative treatment and prophylaxis for the urinary infection. The patient was discharged on the postoperative eighth day.

Case 2- The day after the first patient presented, a 32-year-old male was brought urgently to our emergency service after colliding with the guardrail and wall at high speed while go-karting. His history revealed that he was driving a go-kart at 40 km/h and wearing a helmet as a safety precaution. He was conscious, oriented and cooperative. He had generalized abdominal pain and tenderness in all quadrants. Other systems were normal. Arterial blood pressure was 90/50 mmHg and pulse rate 110 per minute. White blood count was 10,000/mm³, hematocrit 44.3% and hemoglobin 15 g/dl. Other hematologic and biochemical parameters and urine analysis were normal. The plain radiographs of cranium-neck, chest, abdomen, and extremities were normal. Abdominal ultrasound revealed diffuse free liquid between the intestinal loops, but the integrity of parenchymatous organs was normal. Fresh blood was found on paracentesis. Computed tomography was not done because of the clear findings on ultrasound. During the surgical exploration, approximately 2000 ml of blood was seen and aspirated. There was also a 70 cm mesenteric intestinal avulsion 70 cm proximal from the ileocecal valve. This segment was resected and an end-to-end anastomosis was done with double layer sutures. Other parts of intra- and retroperitoneal spaces were normal. Three units of erythrocyte suspension and one unit of fresh frozen plasma were given in the Intensive Care Unit (ICU). The patient was consulted by a urologist, neurosurgeon, orthopedist, and thoracic surgeon. No additional advice was given. On the postoperative second day, the patient began oral feeding and was transported to a clinic. On the postoperative seventh day, his drains were removed, and he was discharged without complication.

DISCUSSION

Go-karting is a variant of an open-wheel motor sport with small, open, four-wheeled vehicles called karts (or go-karts, gearbox/shifter karts) depending on the design. They are usually raced on scaled-down circuits. Indoor and outdoor go-karting tracks accommodate thousands of people. News regarding go-kart accidents can be seen frequently in newspapers, audiovisual media and the Internet; however, accidents

have been reported in biomedical journals rarely. Interestingly, the first scientific paper on this subject used a newspaper report from The Times, dated 14 September 1972.^[1]

It was reported from the Netherlands that approximately 600 patients were admitted to emergency departments annually after go-kart accidents, and 12 severely injured patients were treated at Erasmus MC over a six-year period.^[2] The abdominal injury can be as severe as pancreatic fracture requiring pancreaticojejunostomy.^[3] In fact, go-kart emergencies are not limited to traumatic injuries; acute cardiovascular events can be seen due to hazardous air pollutant levels within the facilities for indoor go-karting.^[9]

Go-kart accidents cause injuries of variable extent and outcome. Eker and colleagues^[2] divided the trauma mechanism and related injuries into three main groups as direct trauma, high energetic deceleration trauma and acceleration/deceleration trauma. They described different kinds of fracture, contusion, abrasion, laceration, and burn wound in group 1, blunt abdominal or thoracic trauma and compression injury to lower extremities in group 2, and flexion/extension injury in group 3. Both of our patients can be included in group 2 according to this classification.

Karts vary widely in speed and some can reach speeds exceeding 160 miles (260 km) per hour, but they generally may be limited to speeds of no more than 15 miles (24 km) per hour.^[10] The chassis is made of a flexible steel tube because there is no suspension. Thus, it is strong enough not to break or give way on turn. Amusement park go-karts can be powered by 4-stroke engines or electric motors, while racing karts use small 2-stroke or 4-stroke engines. As opposed to other sports that involve motorized vehicles such as motocross or Formula 1, implementation of safety measures by manufacturers and managers of go-karting tracks is not mandatory in most cases.^[2] However, driver equipment, such as seat belt, full-face helmet, driving suit, gloves, driving boots, rib protector, and neck collar, has been determined.^[10] In Germany, guidelines for the security of indoor kart centers were worked out but they do not have any legal liability in the case of injury.^[3] The lack of safety devices and the subjective inexperience make this sport a dangerous type of entertainment. The importance of seat belts was highlighted in an experimental test study including go-karts.^[11] In Turkey, we observe generally that the drivers use only a helmet in amusement parks. It was mentioned that the safety helmet is a widely utilized safety measure, resulting in a relatively low incidence of head and neck injuries as compared with traffic accidents.^[2]

The mechanism of injury differs among cases; how-

ever, the most prevalent mechanism is steering wheel trauma. This kind of trauma usually causes chest injuries in car accidents.^[12] However, it was shown that steering wheel trauma can also cause abdominal damage.^[13] The two cases in the present report had abdominal injuries due to steering wheel contact.

Although go-kart accidents have been a recognized type of trauma in Western countries for years, this surgical emergency has become a problem in developing countries only recently. It is a somewhat low-velocity vehicular accident, but can cause serious trauma in places where the formal protective measures are still lacking. Both the customers and the personnel in charge of the facility should be aware of the potential hazards and comply with safety rules and equipment requirements.

REFERENCES

1. Miller SS, Proctor D. Go-kart injuries at a fairground. *Br Med J* 1973;3:685-6.
2. Eker HH, Van Lieshout EM, Den Hartog D, Schipper IB. Trauma mechanisms and injuries associated with go-karting. *Open Orthop J* 2010;4:107-10.
3. Govaert MJ, Ponsen KJ, de Jonge L, de Wit LT, Obertop H. Fracture of the pancreas in two patients after a go-kart accident. *HPB (Oxford)* 2001;3:3-6.
4. Suddaby B, Sourbeer M. Go-kart trauma-the heart of the matter. *Pediatr Nurs* 2004;30:336-7.
5. Bley T, Gahr RH. Risks and injuries of go-karting. [Article in German] *Zentralbl Chir* 2002;127:523-6. [Abstract]
6. Freeman BJ, Feldman A, Mackinnon J. Go-kart injuries of the shoulder region. *Injury* 1994;25:555-7.
7. Youngson GG, Baker R. Go-kart injuries. *Injury* 1978;9:212-5.
8. Heddle RM, Robb WA. Go-kart injuries of the urethra. *J R Coll Surg Edinb* 1974;19:310-2.
9. Kim T, Wagner J. PM2.5 and CO concentrations inside an indoor go-kart facility. *J Occup Environ Hyg* 2010;7:397-406.
10. http://en.wikipedia.org/wiki/Kart_racing.
11. Streff FM, Geller ES. An experimental test of risk compensation: between-subject versus within-subject analyses. *Accid Anal Prev* 1988;20:277-87.
12. Santavirta S, Arajärvi E. Ruptures of the heart in seatbelt wearers. *J Trauma* 1992;32:275-9.
13. Lau IV, Horsch JD, Viano DC, Andrzejak DV. Biomechanics of liver injury by steering wheel loading. *J Trauma* 1987;27:225-35.