

## What Is Your Diagnosis?

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A 25-year-old man presented with a mildly tender, nonblanching, erythematous, ring-shaped lesion on the left forearm. On the same day, several other individuals in contact with the patient also presented with similar lesions on their extremities and/or trunk.

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## The Diagnosis: Paintball Purpura



Distinct ring-shaped purpuric lesion caused by a paintball (A and B).

Physical examination of a patient may show lesions with unclear etiologies until a history of injury is completed. Participation in sports is a common source of lesions that can mimic lesions of systemic conditions.<sup>1</sup> The Figure illustrates a distinct ring-shaped purpuric lesion caused by the impact of a sport paintball traveling at high velocity. It resembles lesions of a variety of dermatoses, including purpura following other forms of trauma with or without underlying coagulopathies or small vessel fragility, insect bite reactions, erythema annulare centrifugum, erythema multiforme, granuloma annulare, and tinea corporis.

Paintball guns, invented in 1970, were originally used to mark trees or cattle. In 1981, paintballs were first aimed at humans for recreational purposes.<sup>2</sup> Since then, paintball has become an international sport with millions of participants annually.<sup>3</sup> Basic game play is similar to a childhood game of tag except tags occur when a player is struck by an opponent's paintball. Paintballs are 0.68-caliber spherical gelatin capsules (17 mm in diameter)

containing colored liquid and weighing about 3.3 g. The balls are held together along an equatorial seam. In regulation play, paintballs are fired by compressed gas-driven guns at up to 280 ft/s (about 85 m/s or 191 mph).<sup>4</sup> The most frequently described paintball injuries in the literature are ocular.<sup>5</sup> However, the frequency of reported major injuries caused by paintballs is low compared with other competitive sports.<sup>3</sup> The regulation paintball protective mask, which covers the eyes, nose, and mouth, is the only required piece of protective clothing at most paintball facilities. Players wear coveralls to provide camouflage, but they generally do not prevent skin lesions.

The cutaneous lesions produced by paintballs are symmetric uniform rings with an outer diameter of 16 to 19 mm and an inner diameter of 10 to 12 mm. On the day the lesion is produced, it is found to consist of purpura with a faint central and surrounding erythema. Lesions are usually mildly tender to palpation, presumably because of contusion of the underlying tissues. The purpuric portion of

### Comparison of Mass, Velocity, Kinetic Energy, and Estimated Kinetic Energy per Maximal Impact Area of a Paintball and Table Tennis Ball\*†

	Mass, kg	Diameter, m	Velocity, m/s	Maximum CSA, m <sup>2</sup>	KE, J	KE/CSA, J/m <sup>2</sup>
Paintball <sup>4</sup>	0.0033	0.017	85	0.000289	11.92	41,245.67
Table tennis ball <sup>8</sup>	0.0025	0.038	45	0.001444	2.53	1752.08

\*CSA indicates cross sectional area; KE, kinetic energy.

†CSA and KE/CSA are estimated. The estimate assumes a circular impact and does not take into account deformation properties of either projectile or rupture of the paintball.

the lesion crusts a few days after the initial injury, and the skin usually returns to normal within 1 to 2 weeks as the crust is exfoliated. In one patient, a hypopigmented macule persisted more than one year following the original paintball game despite the earlier resolution of a purpuric lesion on the leg. Persistent postinflammatory hypopigmentation or hyperpigmentation is common following cutaneous injury in individuals with medium to dark skin tones.

Similar traumatic lesions have been reported in the literature.<sup>6,7</sup> In 1989, Scott and Scott<sup>8</sup> described erythematous annular lesions caused by the impact of a table tennis ball. The lesions were labeled *ping-pong patches*. The researchers discussed a mechanism by which dimpling of the leading surface of the table tennis ball causes a smaller, ring-shaped lesion on the skin on impact. Therefore, a ball with a 38-mm diameter produces a lesion 12 to 15 mm wide.<sup>8</sup> In contrast, the lesion produced by a speeding paintball tends to be slightly larger than the diameter of the paintball, which suggests that the capillary leakage causing the purpura results from blood being forcefully driven away from the center of the lesion. Also, table tennis balls dimple on impact and then resume their normal shape,<sup>8</sup> paintballs are designed to burst along the seam and empty their contents on the target.<sup>4</sup> The Table lists the physical parameters of paintball and table

tennis ball impacts for comparison. Although ping-pong patches are reported to be erythematous for the most part and occasionally purpuric,<sup>8</sup> the greater kinetic energy and smaller impact area of the paintball on exposed skin surfaces produces classic lesions of paintball purpura.

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