Poikilocytosis of Newborn Calves

Teruo SATO and Mitsuyasu MIZUNO

Veterinary Clinic and Training Center, Federation of the Hokkaido Agricultural Mutual Relief Association, 612 Motonopporo, Ebetsu, Hokkaido 067-01
and
1) Department of Veterinary Internal Medicine, School of Veterinary Medicine, College of Dairying (Rakuno-Gakuen), 582 Nishinopporo, Ebetsu, Hokkaido 069-01

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In 1970, poikilocytosis of a newborn calf with severe dyspnea was observed. The case successfully responded to the blood transfusion and oxygen therapy. Thereafter, the authors have observed other six cases with the same symptoms. They were six Holstein-Friesian calves and a Japanese black one aged from newborn to 25 days of life. Their dams were reared on seven dairy farms in Hokkaido, Japan, during the period from 1969 to 1979.

Case No. 1 was first found severely dyspneic at birth after being relieved from dystocia and given intravenously 1,000 ml of blood. The laboratory work revealed poikilocytosis in this calf. Case No. 2 was dyspneic at birth, and treated as in case No. 1. Cases Nos. 3, 4, and 5 were dyspneic at birth and the condition did not change for days. The owners had thought that the sick calves would improve if given good care until the clinicians made a diagnosis of poikilocytosis. Cases Nos. 6 and 7 were dyspneic from birth and treated with several kinds of antibiotics as pneumonia. The antibiotic treatments did not improve the condition of these two sick calves during days 7 and 25 until they were diagnosed as poikilocytosis.

The main signs of all cases except No. 5 were dyspnea with respiration rates of 45/min to 160/min, weakness, and occasionally anemic with much faster heart rates of 100/min to 240/min. The body temperature remained almost normal in most cases. Neither hemolysis nor hemoglobinuria was observed in any case. Most cases responded successfully to transfusion of 500 to 1,000 ml of blood.

Low levels of PCV, RBC, and MCHC were observed in some cases (Table 1). Marked poikilocytosis was of common finding in all cases. Similar irregularity of the red blood cells was seen in blood smears prepared from fresh and anticoagulated blood samples (Fig. 1).

Poikilocytes in case No. 1 disappeared mostly on the 3rd day after the first blood transfusion and the clinical signs concomitantly subsided. There were no hematological follow-ups of other six cases.

With a 24 gauge needle, about eight drops of fresh blood were taken from the jugular vein of each sick calf and fixed in 10 ml of glutaraldehyde in phosphate buffer solution (pH 7.4, osmolarity 310 mOsm). Various types of irregularly contoured red cells with spicules (Fig. 2) were observed by
Table 1. Hematological findings

<table>
<thead>
<tr>
<th>Items</th>
<th>Case No.</th>
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<tr>
<td></td>
<td>1</td>
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<tr>
<td>PCV (%)</td>
<td>13.0</td>
</tr>
<tr>
<td>RBC (×10^4/μl)</td>
<td>282</td>
</tr>
<tr>
<td>Hb (g/dl)</td>
<td>ND</td>
</tr>
<tr>
<td>MCV (fl)</td>
<td>46</td>
</tr>
<tr>
<td>MCH (pg)</td>
<td>ND</td>
</tr>
<tr>
<td>MCHC (g/dl)</td>
<td>ND</td>
</tr>
</tbody>
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Morphology of RBC

Poikilocytosis

Anisocytosis

WBC (μl)

Plasma protein

Fibrinogen (g/l)

ND=not determined. The plasma samples were analyzed for fibrinogen by Smith and Koneko's method [5]. Two blood smears were prepared from fresh and unanticoagulated blood samples and stained with Giemsa stain.

scanning electron microscopy in all cases except the first one.

Pleomorphic erythrocytes have been reported in such animal species as deer, sheep, and goat [2, 3, 7], but not in the newborn calf.

The erythrocytes of the calf cases resemble morphologically to those of the human cases described by Besis [1]. Shull et al. [6] and Harvey [3] indicated the appearance of poikilocytes in such diseased conditions as hepatic diseases, infections, poisoning with chemical and physical agents. Such were not observed in the present cases. Jain [4] indicated that deoxygenation and reoxygenation caused reversible pleomorphic erythrocytes in goats.

The cause of poikilocytosis remains unknown. From the successful recovery from deformation of erythrocytes in the sick calves after the blood transfusion therapy, the abnormal morphology may be attributable to the abnormal oxygen-binding capacity of the affected calves.

It can be concluded that poikilocytosis of newborn calves is characterized by the faster respiration rate at birth and irregularly contoured red blood cells with spicules. Hematological examinations of the dyspneic calves are necessary for differential diagnosis of poikilocytosis and pneumonia. This may be the first report on poikilocytosis of newborn calves.

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REFERENCES

POIKILOCYTOSIS OF NEWBORN CALVES


EXPLANATION OF FIGURES

Fig. 1. Light microscopy of blood smear (Case No. 1). Many poikilocytes and anisocytosis are observed. ×1,750.

Fig. 2. Scanning electron microscopy of poikilocytes (Case No. 3). Irregularly contoured red cells with spicules. ×7,000.

要 約

新生仔牛の変形赤血球増加症（短報）：佐藤耕一・中野光康(北海道農業共済組合連合会講習所，酪農学園大学家畜内科学教室)——出生直後から異常な呼吸速迫を示した牛新生子の多数例において、著明な赤血球の変形が認められた。これらの呼吸速迫例は500〜1,000 mlの輸血により速やかに回復、回復した。本症は、体温変化のないこと、肺聴診で異常がないこと、さらに赤血球の形態異常などから、肺炎との識別が可能であった。