

This is the chronic eruptive stage of infection with *Bartonella bacilliformis*. The painless wart-like skin eruption results from the abnormal growth of blood vessels with the appearance of haemangiomas and the formation of angioblastic nodules. At this stage *Bartonella* can still be found in the endothelial cells, but they are only very rarely found in the erythrocytes.



Verruga peruviana in chronic bartonellosis (infection with *Bartonella bacilliformis*). Do not confuse this lesion with a granuloma pyogenicum. Copyright Alexander von Humboldt Institute, Peru



Bacillary angiomatosis. Ulcer due to infection with *Bartonella henselae*. Copyright Alexander von Humboldt Institute, Peru

The skin eruption usually appears **6 to 14 weeks after the acute stage**. Both pathological conditions can be present at the same time. The skin eruption may initially be accompanied by a mild fever and arthralgia. The eruption is polymorphic. Some lesions disappear quickly, others persist or grow for some time only to shrivel and disappear, generally without leaving scars. There are three forms:

**Miliary** form: the lesions are small (< 0.5 cm), very numerous and mainly found on the face, on the extensor surface of the limbs and on the trunk. They are initially macular and grow to small vascular, sometimes pedunculated and protruding nodules. Lesions are also present on

the digestive and genito-urinary mucosa. Dysphagia, haematemesis, melaena, haematuria and metrorrhagia can occur.

**Nodular** form: the nodules are larger, less numerous, deeper, chronic and mainly found around the elbows and knees. The mucous membranes are spared. The lesions appear in cycles for 2 to 3 months.

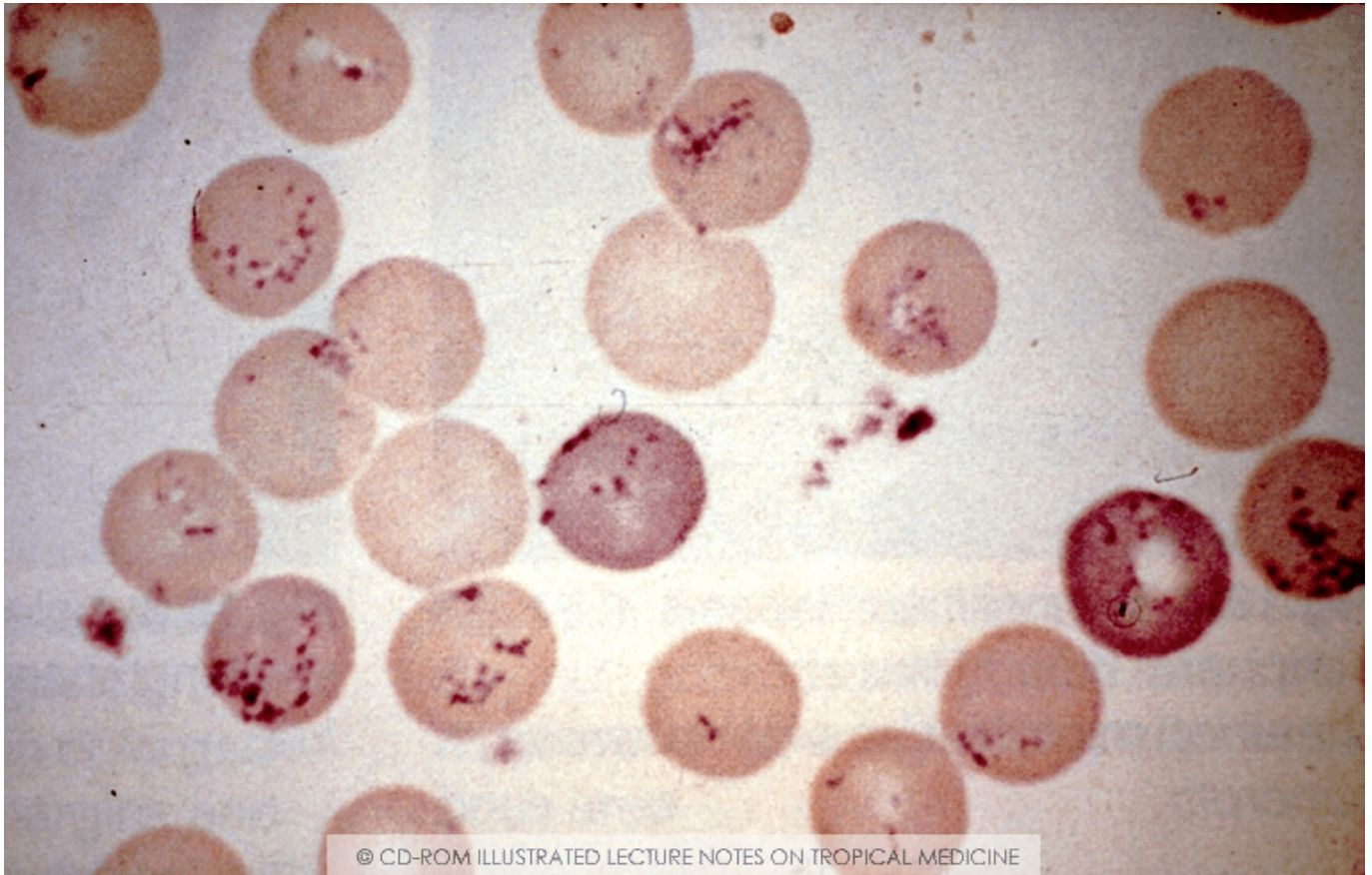
**Mular** form: there are isolated pseudotumoural haemorrhagic nodules which macroscopically resemble granuloma pyogenicum.

## Immunity

Immunity is **gradually acquired during the acute stage**, so that the disease becomes **limited to the wart-like lesions** of the skin and mucous membranes which subsequently heal completely and permanently. In experimentally infected monkeys **the disease can be reversed** from the verruga stage to the febrile haemolytic stage by splenectomy. The same probably occurs in humans. The prognosis of verruga is good. They evolve in spurts and the lesions generally heal spontaneously in less than 6 months.

## Diagnosis

The diagnosis is based on the endemicity, the clinical characteristics, full blood count, the presence of *Bartonella* in blood smears (Giemsa stain), blood cultures or tissue cultures from skin lesions or even the histological examination of the latter. More than 70 percent of patients with acute Oroya fever have a positive blood culture for *B. bacilliformis*, although there may be a delay of more than 14 days for the organism to grow in culture. *B. bacilliformis* is fastidious and requires Columbia agar, an enriched blood medium, for growth, which occurs most readily at 25 to 28°C.



*Bartonella bacilliformis* in red blood cells

In the differential diagnosis, consideration is given to malaria, dengue, viral hepatitis, babesiosis, bacillary angiomatosis in AIDS patients, typhus, typhoid fever, Yaws, Kaposi's sarcoma, haemangiomas, pyogenic granuloma and various skin tumours. In mild forms, the number of *Bartonella* in the blood smear can fall below the detection limit. The degree of haemolysis is then very limited, and the infection is extremely difficult to diagnose if no serology is available. PCR, Immunofluorescence, ELISA and Western Blot among others are used for diagnosis.

## Treatment

Until recently **chloramphenicol** was the drug of choice but **ciprofloxacin** has now been shown to give better results. Both are also effective in *Salmonella* infections (in absence of resistance). Chloramphenicol is administered at doses of 4 g/day for 5 days. Ciprofloxacin is given as 500 mg BD. The fever disappears in less than 48 hours. The mortality rate of Oroya

fever can be largely reduced with antibiotic therapy. Late development of the verruga stage is possible despite correct treatment. Ciprofloxacin or rifampicin for 2 to 3 weeks can be used in the verruga stage.

## **Disease control**

Spraying with insecticides, especially those which retain their activity for long periods interrupts transmission. However, control measures are not essential in endemic areas because of the immunity of the adult population. Individual protection consists of avoiding spending the night in exposed biotopes and the use of insect repellents or mosquito nets treated with permethrin/deltamethrin.

Although theoretically possible vaccination is not used.