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HAEMATOGENOUS SALMONELLA INFECTION AROUND A METAL HIP ENDOPROSTHESIS

By

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When infection occurs around a metal implant used in orthopaedic surgery it is mostly a result of inoculation of bacteria during operation. However, we have seen signs of infection appearing around implanted metal appliances more than eight months after primary wound healing without any signs of inflammation immediately after operation. In such cases the question arises whether there is a risk of haematogenous infection in the tissues situated close to a metal implant which is greater than in other parts of the body. When infection with common bacteria occurs close to a metal implant even years after surgery, it can seldom be proved whether inoculation has taken place at the operation or not.

In the case described, a Salmonella infection arose around a Vitallium endoprosthesis three and a half years after implantation of the prosthesis.

CASE REPORT

A woman aged forty-two years sustained a traumatic dislocation of the left hip in 1954. After reduction the hip was free of symptoms for about one year. In 1958, necrosis of the femoral head was clearly evident on the radiograph. On May 5, 1959, a vitallium hip endoprosthesis of the Thompson type was implanted through an anterior incision. Figure 1 shows a radiograph of the hip taken one day before the operation.

The hip was free of pain for three and a half years after the operation. The patient represented an ideal functional result of implantation of a hip endoprosthesis. Figure 2 shows the hip one year and nine months after the operation.

During a visit to a Mediterranean country in August and September 1962 the patient suffered from a gastro-intestinal infection of an undefined nature. After this there had been some pain in the left hip. On October 21, 1962 fever and acute

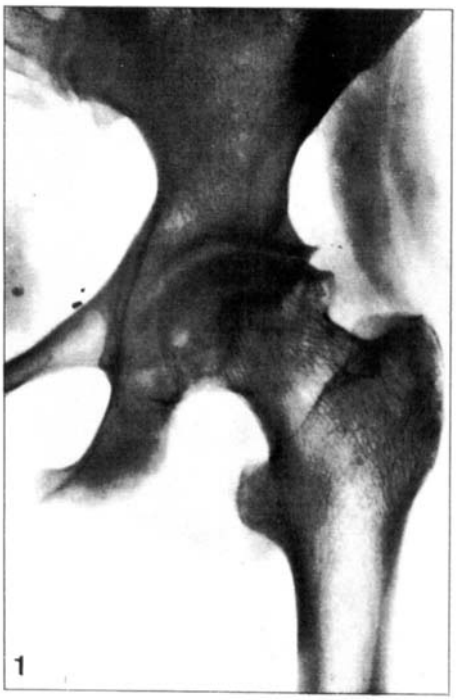

Figure 1. Posttraumatic necrosis of the head of the femur. Female, age 42 years. Radiograph taken before implantation of an endoprosthesis. Figures 2 and 3 show the same hip.

severe pain in the hip occurred. On October 23 the sedimentation rate of the blood was 33 millimeters per hour. There was slight leucocytosis and fever.

Inflammation of the hip was diagnosed and a course of Chloramphenicol was immediately instituted. A few days later the patient started to feel pain and notice swelling in both ankles and in the metatarso-phalangeal joint of the right big toe. The Latex test was positive, the content of uric acid in the blood was normal. After two weeks treatment the hip was almost free of symptoms. The diagnosis was still open.

In December 1962, the symptoms from the hip recurred. On January 11, 1963, the left hip was punctured and from the thick fluid obtained *Salmonella Newport* was cultured. Cultures from faeces and urine were negative. The Widal test for Salmonella Newport was positive (+1/160).

In cooperation with bacteriologists and epidemiologists different kinds of conservative treatment were tried over a period of one-and-a-half years. In spite of this, Salmonella Newport was cultured eleven times from fluid obtained by puncture of the joint between January 11, 1963, and July 30, 1964.

The bacterium was several times shown to be sensitive to Chloramphenicol, Tetracycline, Streptomycin and Sulfa-drugs. Protracted courses of these drugs and of Ampicillin (Doktacillin) were tried with some effect on the symptoms

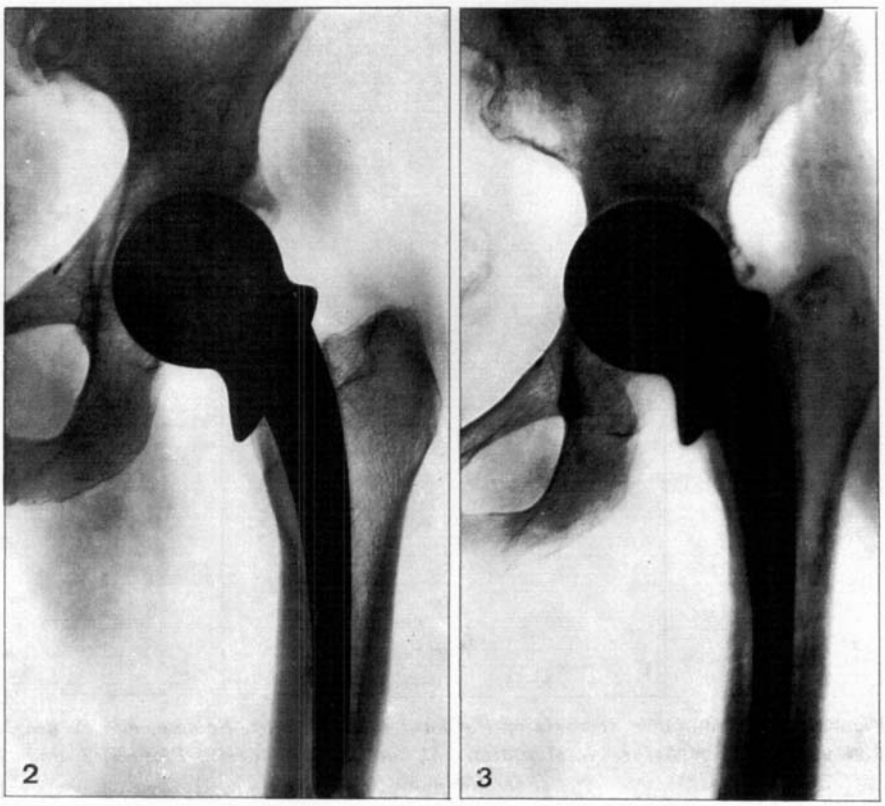

Figure 2. The hip one year and nine months after insertion of the endoprosthesis. Normal range of motion. No limp. No pain.

Figure 3. The hip one–and–a–half years after haematogenous infection by Salmonella Newport. The prosthesis is protruding into the pelvis. Resorption of bone around the shaft.

but without eradication of the infection. Continuous irrigation of the joint with Streptomycin for eight days, a prolonged course of injections of autovaccine prepared from the Salmonella Newport culture and a course of small doses of arsenic were tried without effect. No fistula opened from the joint during the whole period of observation.

Slight destruction of bone at the joint surface of the acetabulum was seen on the radiograph in January 1963. In May 1964, the endoprosthesis had protruded into the pelvis and there was resorption around the shaft of the prosthesis (Figure 3). The endoprosthesis was removed on August 13, 1964. The patient had refused earlier removal of it because the symptoms varied and weightbearing of the hip was possible for long periods.

Culture from the joint fluid was negative in February 1965, and no signs of inflammation have occurred since then. The patient is walking without pain but

with a cane. Recently, in January 1967, she has asked for the insertion of a new endoprosthesis, but the risk of flare-up of Salmonella infection is evident. In addition the acetabulum is too irregular to guarantee a good result.

DISCUSSION

There seems to be no doubt that the Salmonella infection around the hip endoprosthesis in the case described arose on the haematogenous route. After three and a half years of excellent functioning of the hip, symptoms and signs of inflammation appeared in it soon after a gastrointestinal infection sustained in a Mediterranean country. Salmonella Newport infection has very seldom been seen in Finland, and in 1959, when the endoprosthesis was implanted, this bacillus had not been cultured from any patient in the country. The same was true in the years that followed, until the bacillus was cultured from our patient in 1963.

The tendency of Salmonella infections to spread in the body on the haematogenous route is well known. Staphylococci as well as other bacteria have this tendency in varying degrees. Osteomyelitis due to Salmonella infection is frequently seen but Salmonella arthritis is rare (*Reeves & Churchill-Davidson,* 1964). When typhoid arthritis appears it has a special predilection for the hip (*Greets,* 1964). In 1965 *Weinstein & Kaplan* reported a case in which Salmonella bacteremia was associated with infection of the aorta in the area at which a Hufnagel valve had been implanted four years earlier for mitral insufficiency. They pointed out that bacteremia seems to be especially ominous when such a prosthesis is present.

Probably there are special reasons to protect persons who have had large metal appliances implanted in any part of the body, against haematogenous spread by antibiotics when bacteremia is present or threatening.

We have seen infections around Vitallium appliances, even around hip endoprostheses, heal without removal of the metal piece when the virulence of the bacteria has been very low. Protracted conservative treatment in this case thus seemed justified especially when the patient refused removal of the prosthesis. However, possibly a better acetabulum would have remained if the metal had been removed at an earlier stage, thus leaving better possibilities for a later insertion of a new prosthesis.

Even where staphylococci are concerned, the insertion of an endoprosthesis in a formerly infected hip joint carries a risk of the flare-up

of infection. In a patient treated by us, a staphylococcus infection flared up after application of a Vitallium hip endoprosthesis when the infection had been quiescent for years. In 1953 *A. Langenskiöld* reported a case in which a Salmonella Paratyphi B infection flared up in silk granulomas in the abdominal wall two years after cholecystectomy for carrier state. Cases of Salmonella osteomyelitis flaring up after decades of quiescence have also been seen.

SUMMARY AND CONCLUSIONS

A Vitallium hip endoprosthesis had been implanted in a woman for posttraumatic necrosis of the head of the femur. Salmonella Newport infection around the prosthesis occurred following gastro-intestinal infection three and a half years after the operation. The specifity of the bacterium proved that the infection of the hip had arisen on the haematogenous route. Removal of the prosthesis was inevitable because all other treatment failed.

The possibility of haematogenous infection around large metal implants might deserve special prophylactic measures when there is a risk of bacteremia from general or local infections.

RESUME

Une endoprothèse de la hanche en vitallium a été implantée chez une femme en raison d'une nécrose post- traumatique de la tête du femur. Une infection de Salmonella Newport autour de la prothèse se manifesta à la suite d'une infection gastro-intestinale trois ans et demi après l'operation. La spécificité des batéries prouva que l'infection de la hanche s'était produite par la voie hématogène. Le retrait de la prothèse était inévitable, tous les autres traitements s'étant montrés vains.

La possibilité d'une infection hématogène autour d'une large implantation métallique requiert des mesures prophylactiques spéciales lorsqu'il y a danger de bactériémie d'infection générale ou locale.

ZUSAMMENFASSUNG

Bei einer Frau, in die dreiundeinhalb Jahren früher eine Vitallium Hüftendoprothese wegen einer posttraumatischen Femurkopfnekrose implantiert wurde, trat eine Salmonella Newport Infektion der Hüfte

nach einer gastro-intestinalen Infektion auf. Die Spezifität der Bakterie war ein Beweis dafür, dass die Infektion der Hüfte auf dem haematogenem Weg entstanden war. Die Entfernung der Prothese war unvermeidlich da alle andere Behandlung vergebens war.

Die Möglichkeit einer haematogenen Infektion in der Umgebung von grossen Metallimplantaten kann prophylaktische Massnahmen motivieren wenn ein Risiko für Bakteriämie von allgemeinen oder lokalen Infektionen vorhanden ist.

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