



## CASE REPORT

# Case of Rapidly Progressing Angiosarcoma after Total Hip Arthroplasty

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The occurrence of malignant tumor in proximity to an arthroplasty prosthesis has been a matter of debate since it was first reported in 1978. Upon considering the number of orthopedic implants used, the occurrence of malignancy is rare. Especially in case of angiosarcoma, only a few cases have been reported worldwide. In this case, we report an extremely rare case of angiosarcoma arising at the site of a revision total hip arthroplasty. A 69-year-old female had received total hip replacement on her left hip due to osteoarthritis 8 months ago. Four months later, she complained pain on her operated area, X-ray showed loosening of implanted cup on her left hip. Thereafter, erythematous and purpuric papules and nodules were developed and spread around on her left hip. Through the skin biopsy she was diagnosed with angiosarcoma, and then she died of a sharp deterioration. Herein, we report a rare case of angiosarcoma occurred after total hip replacement with a review of the literature. (*Ann Dermatol* 33(4) 377~381, 2021)

**-Keywords-**

Angiosarcoma, Arthroplasty, replacement, hip, Orthopedic procedures, Sarcoma

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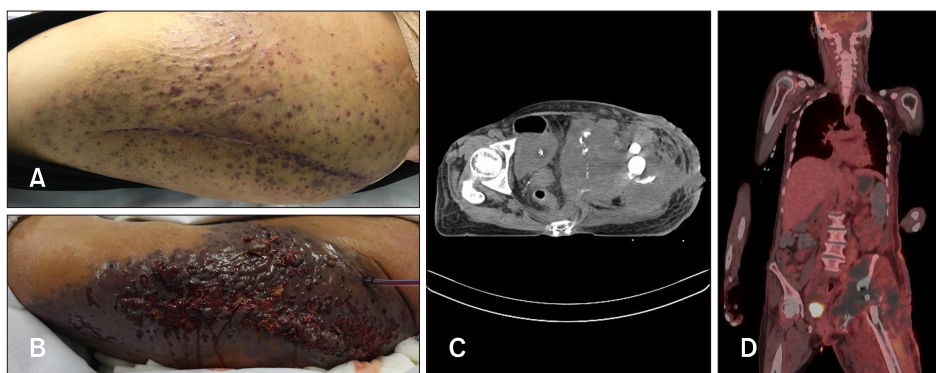
## INTRODUCTION

Angiosarcoma is a malignant tumor of endothelium origin; angiosarcomas are classified into primary angiosarcoma that occurs primarily in the scalp or facial area in elderly and secondary angiosarcoma arises after radiation therapy or trauma. With the increase in elderly population, the number of arthroplasty procedures being performed as operative treatment for geriatric osteoarthritis has also increased<sup>1,2</sup>. In this case report, we report a case of rapidly progressing angiosarcoma arising in the vicinity of the surgical site after total hip arthroplasty within less than a year.

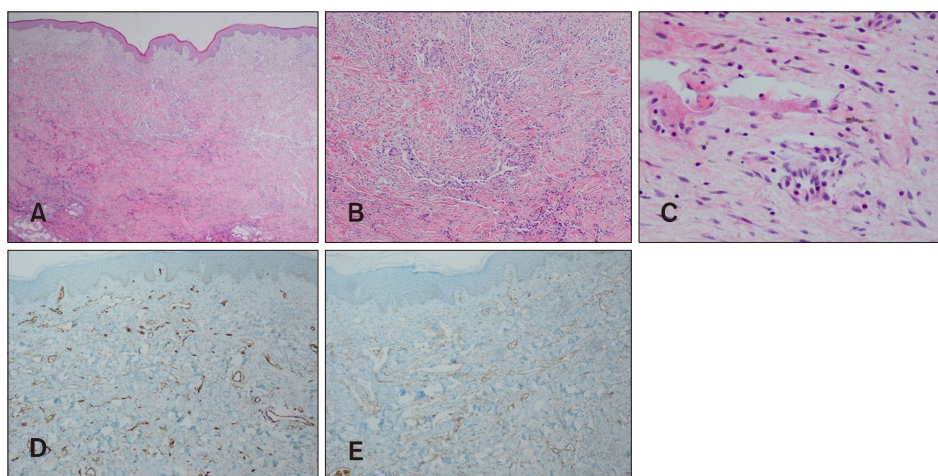
## CASE REPORT

A 69-year-old female had presented with asymptomatic erythematous to purple macules and papules on the left thigh area that had gradually spread to the periphery approximately a month ago (Fig. 1A). We received the patient's consent form about all photographic materials. She had undergone a total hip replacement surgery 8 months ago because of osteoarthritis of the left hip joint. Three months later, she had a fall and received a reattachment surgery because of muscle detachment at the surgical site. Again, a month later, she underwent revision total hip arthroplasty due to cup loosening in the left hip which was confirmed by X-ray findings. She was discharged after the operation; however, because she experienced continuous pain around the surgical area, she was re-admitted to the orthopedic surgery department and referred to our department for her skin lesions. We performed a skin biopsy on a purpuric papule around the incision site.

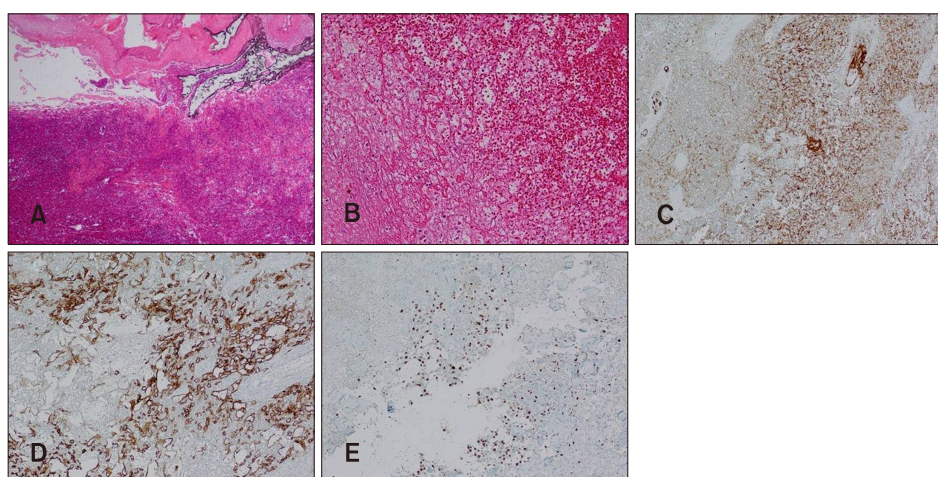
On histological examination, an irregular slit-like space was observed in the dermis and inflammatory cells were observed around blood vessels (Fig. 2A, B). However, cellular atypia could not be identified (Fig. 2C). Clinically,



**Fig. 1.** (A) Erythematous and purpuric papules and nodules on a brownish patch on the left hip area. (B) Exacerbated brownish nodules, masses, and superficial ulcers with severe hemorrhage on a diffuse red to violaceous patch. (C) Computed tomography and (D) positron emission tomography-computed tomography images showing a huge malignant mass in the left pelvic cavity invading the left flank, left buttock, left iliac bone, left pubic bone, and left femur. No evidence was observed of lymph node or distant metastasis. We received the patient’s consent form about publishing all photographic materials.



**Fig. 2.** (A) Irregular slit-like spaces throughout the dermis (H&E,  $\times 40$ ). (B) Some inflammatory cells around blood vessels (H&E,  $\times 100$ ). (C) Absence of cellular atypia (H&E,  $\times 400$ ). (D) Negative CD31 expression (CD31 stain,  $\times 40$ ). (E) Negative CD34 expression (CD34 stain,  $\times 40$ ).



**Fig. 3.** (A) Histological examination of the re-biopsied specimen showing difficult to find structure of the original epidermis and dermis (H&E,  $\times 40$ ). (B) Broadened slit-like spaces and massive red blood cell extravasation (H&E,  $\times 100$ ). (C) Positive CD31 expression (CD31 stain,  $\times 100$ ). (D) Positive D2-40 expression (D2-40 stain,  $\times 100$ ). (E) Positive Ki-67 expression (29%, Ki-67 stain,  $\times 100$ ).

angiosarcoma or other sarcomas were suspected; however, the specimen tested negative for both CD31 (Fig. 2D) and CD34 (Fig. 2E). She was diagnosed with chronic dermatitis based on pathological findings. She was treated

with systemic antibiotics; however, the skin lesion became worsened and was accompanied by hemorrhage. After two months, skin symptoms aggravated rapidly and she was again referred to our department. At the time of

referral, skin lesion had increased in size; brown nodules, masses, superficial ulcers, and severe hemorrhage were observed on the reddish patch (Fig. 1B). She received several transfusions because of persistent severe hemorrhage in the lesion, and the lesion was re-biopsied.

On histopathological examination, epidermal and dermal structures were difficult to find; widened slit-like spaces and massive RBC extravasation were observed (Fig. 3A, B). The specimen tested positive for CD31 (Fig. 3C), D2-40 (Fig. 3D), and Ki-67 (29%) (Fig. 3E). Computed tomography (CT) and positron emission tomography-computed tomography (PET-CT) revealed large hypermetabolic masses on the left flank and both hips and thighs. No lymph node or distant metastases were observed (Fig. 1C, D). She was finally diagnosed with angiosarcoma and transferred to the hemato-oncology department. After 4 cycles of radiotherapy, the mass reduced in size, but her general condition deteriorated. Eventually, she died within 40 days due to septic shock.

## DISCUSSION

Angiosarcoma is a malignant tumor of endothelial origin and accounts for 2% to 4% of sarcomas arising in soft tissue<sup>1,3</sup>. The etiology is not clear, but trauma, radiation ther-

apy, and retained foreign materials are known risk factors<sup>4</sup>.

Total hip arthroplasty is a treatment option for osteoarthritis associated with severe hip pain in elderly. Soft tissue sarcoma is a rare late complication of total hip arthroplasty; there have been several reported cases of liposarcoma, synovial sarcoma, malignant fibrous histiocytoma, and osteosarcoma<sup>5-8</sup>. In case of angiosarcoma, total 11 cases including our patient have been reported until now (Table 1)<sup>2,3,9-11</sup>.

Although there is no clear evidence of the pathogenic role of arthroplasty in development of angiosarcoma, several risk factors may play an important role<sup>3</sup>. The potential carcinogenicity of materials including metal alloys, polymers, and ceramics used in total hip arthroplasty should also be considered<sup>2,12,13</sup>. Despite the increasing use of prosthetic devices, the potential risk of side effects of these devices, including malignant tumors, is underestimated<sup>2</sup>. Consideration should be given not only to the local side effects, but also to the systemic effects of eroded or dissolved implant debris that is carried through the blood and lymphatic system<sup>2</sup>.

Several studies have addressed the carcinogenicity of wear particles of cobalt-chrome prostheses<sup>2,13</sup>. Penman and Ring<sup>8</sup> reported a case in which 5 years after the implantation of

**Table 1.** Review of literature

Author	Sex/age (yr)	Orthopedic implants	Interval time from THR to AS	Symptom	Diagnosis	Treatment	Clinical course
van der List et al. <sup>9</sup>	Male/75	Metal Poly-ethylene	11 years	Pain	Epithelioid angiosarcoma	Not mentioned	Not mentioned
Mallick et al. <sup>2</sup>	Female/84	Metal Poly-ethylene	30 years	Pain, anemia	Epithelioid angiosarcoma	Not mentioned	Not mentioned
Agaimy et al. <sup>10</sup>	Male/78	Not mentioned	17 years	Anemia	Epithelioid angiosarcoma	Not mentioned	Not mentioned
Agaimy et al. <sup>10</sup>	Male/55	Not mentioned	Not mentioned	Anemia	Epithelioid angiosarcoma	Not mentioned	Not mentioned
Zhu et al. <sup>11</sup>	Not mentioned	Metal Poly-ethylene	Not mentioned	Pain, anemia, hematoma	Angiosarcoma	Not mentioned	Not mentioned
Terrando et al. <sup>3</sup>	Male/75	Metal Poly-ethylene	7 years	Pain, anemia, weight loss	Epithelioid angiosarcoma	Surgery	Undergoing chemotherapy
Terrando et al. <sup>3</sup>	Male/74	Metal Poly-ethylene	16 years	Pain, anemia, weight loss	Epithelioid angiosarcoma	Surgery	Died in 27 months after surgery
Terrando et al. <sup>3</sup>	Female/63	Metal Poly-ethylene	31 years	Pain	Epithelioid angiosarcoma	Surgery	Died in 5 months after diagnosis
Terrando et al. <sup>3</sup>	Male/80	Metal Poly-ethylene	27 years	Anemia, swelling, dysfunction	Epithelioid angiosarcoma	Surgery	Died in 4 months after diagnosis
Terrando et al. <sup>3</sup>	Female/76	Metal Poly-ethylene	13 years	No symptoms	Epithelioid angiosarcoma	Surgery	Died in 9 months after diagnosis
Current case	Female/67	Metal Poly-ethylene	8 months	Pain, anemia, skin lesions	Epithelioid angiosarcoma	Radiotherapy	Died in 40 days after diagnosis

THR: total hip replacement surgery, AS: angiosarcoma.

cobalt-chrome prostheses, osteosarcoma developed at the site of total hip arthroplasty. In addition, although it is generally known that fragmented polyethylene is not carcinogenic, Carter and Roe<sup>14</sup> were able to induce sarcomas by injecting polyethylene pieces into rats. According to Jennings et al.<sup>15</sup>, retained foreign materials can induce angiosarcoma through solid-state tumorigenesis in humans. The crucial factors affecting the induction of these sarcomas are constitution of the foreign body, amount of foreign material, and a long incubation period during which atypical elements can progress to neoplasia in an unstable environment<sup>2,15</sup>. The average incubation period until occurrence of sarcoma after total hip arthroplasty is 6~10 years<sup>2</sup>.

In our case, it took less than a year from surgery to occurrence of sarcoma, and the rapid progression is the novelty of this case. Compared to our case, other cases reported sarcomatous change more than 6 years after prosthetic arthroplasty; the rapid progression in this case was due to trauma (fall) after repeated arthroplasty and additional surgery performed for repeated cup loosening.

In many cases, the diagnosis was frequently delayed because of false positive results misinterpreted as reactive changes on histological examination<sup>3</sup>. Therefore, on observing osteolysis or cup loosening accompanied with pain, rapid progression of skin lesions, aggravation of general condition, and increased size of soft tissue mass around the surgical site after total hip arthroplasty, we suggest careful observation must be considered. Also, the PET-CT is an effective diagnostic tool for the evaluation of both primary and locally or metastatic, recurrent angiosarcomas<sup>16</sup>. Also, PET-CT can aid correct treatment planning as it can be used for the detection of local recurrence, and even maximal standardized uptake value can be considered an important prognostic factor for overall survival<sup>16</sup>.

Due to the rarity of angiosarcoma and the lack of prospective evidence, the optimal management strategy and ideal treatment method are still being debated<sup>17</sup>. Current treatment options include surgery, radiotherapy, chemotherapy, targeted medicines and immunotherapy<sup>17</sup>. While surgery is still thought to be the most reliable curative treatment, but it is contraindicated in some older individuals and has a high rate of recurrence regardless of surgical margin status<sup>17</sup>. In our case, the patient was thought to be too old to endure massive excision with skin graft, and also because the extent and margin of angiosarcoma was unclear, she underwent radiotherapy.

As the elderly population increases, late complications, although not frequently, such as angiosarcoma are expected to increase. Despite reports of related cases, no definitive

cause of sarcoma arising after arthroplasty has been found. Herein, we report a case of rapidly progressing angiosarcoma after total hip arthroplasty within less than a year, raising the need for additional studies conducted to identify the causes while continuing collection of similar cases.

## CONFLICTS OF INTEREST

The authors have nothing to disclose.

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