Arthroplasty Today 5 (2019) 292–295

Contents lists available at ScienceDirect

Arthroplasty Today

journal homepage: http://www.arthroplastytoday.org/

Case report

Incisional squamous cell carcinoma after total knee arthroplasty

Shane R. Hess, DO [a, *], Nicholas A. Rudloff, DO [b]

[a] Department of Orthopedics, The CORE Institute, Phoenix, AZ, USA
[b] Sunflower Dermatology, Riverside, MO, USA

ARTICLE INFO

Article history:
Received 31 May 2019
Received in revised form
11 July 2019
Accepted 12 July 2019
Available online 8 August 2019

Keywords:
Total knee arthroplasty (TKA)
Complications
Wound
Incision
Cancer
Squamous cell carcinoma

ABSTRACT

With the rising number of total knee arthroplasties being performed annually, the number of complications associated with this procedure will also continue to rise. The most common reasons for revision include infection, instability, and aseptic loosening. Fortunately, wound complications are rare, and in this case report, we describe the development of a well-differentiated squamous cell carcinoma, keratoacanthomatous type, within the surgical incision of a total knee arthroplasty several months after the index procedure.

Introduction

Total knee arthroplasty (TKA) is one of the most common orthopedic procedures, with patient satisfaction rates ranging from 80% to 100% [1]. The number of TKAs performed each year is increasing, with an estimated 3 million procedures per year by 2030 [2]. With an increase in TKA procedures also comes an increase in complications. The most common reasons for revision include infection, instability, and aseptic loosening [3]. Fortunately, wound complications are rare, affecting approximately 0.33% of TKAs in one registry [4].

Squamous cell carcinoma (SCC) accounts for up to 20% of skin cancers [5]. SCC, keratoacanthoma type (KA), is considered a form of well-differentiated SCC. With various proposed etiologies, KA presenting within a surgical scar is rare. We present a case report describing the development of KA within a surgical incision a few months after an uneventful TKA.

Case history

The patient is a 65-year-old male who underwent a routine TKA without perioperative complications. He had no history of trauma or infection involving that knee before TKA. Intraoperatively, blood loss was documented to be 100 mL, and tourniquet time was 46 minute at 250 mm Hg. General anesthesia with an adductor canal block was administered. Wound closure included 0-vicryl for the medial parapatellar arthrotomy, 2-0 vicryl subcutaneously, and staples for skin. A standard waterproof bandage was used for the dressing and was maintained until his first postoperative appointment. There were no postoperative complications, and the patient was discharged home on day zero after meeting physical therapy goals. Medications for pain control and DVT prophylaxis were provided to the patient.

At his 2-week postoperative visit, the staples were removed, and the wound was clean, dry, and intact without signs of infection. His examination was unremarkable, and there were no concerns. At 6 weeks, he was back to his normal activities of daily living without any complaints with a range of motion of 0°-125°.

At 4 months postoperatively, the patient presented for evaluation of a lump that had developed on his TKA incision approximately 2 weeks prior. An ultrasound ordered by his primary care physician reported "mass-like area of subcutaneous thickening likely reflecting granulation tissue." The lesion was a 1 cm × 1 cm, round, raised nodule located within the previous midline TKA incision at the level

No author associated with this paper has disclosed any potential or pertinent conflicts which may be perceived to have impending conflict with this work. For full disclosure statements refer to https://doi.org/10.1016/j.artd.2019.07.005.

* Corresponding author. The CORE Institute Center for Orthopedic Research and Education, 18444 N. 25th Avenue, Phoenix, AZ 85023, USA. Tel.: +1 866 974 2673.
E-mail address: drshane33@gmail.com

https://doi.org/10.1016/j.artd.2019.07.005

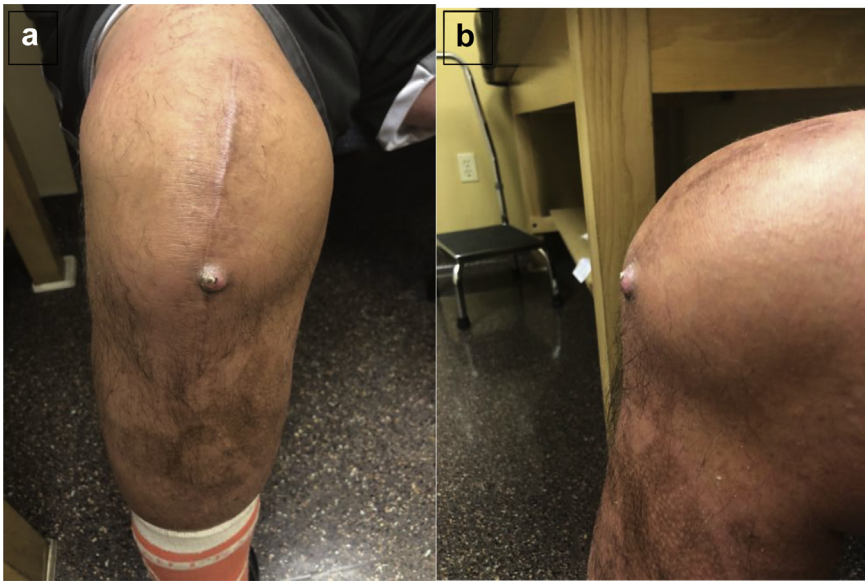

Figure 1. Picture of the patient's knee from the front (a) and side (b) showing the 1 cm × 1 cm, round, raised nodule located within the previous midline TKA incision at the level of the joint line with a central keratin plug.

of the joint line with a central keratin plug (Fig. 1). It was not friable, and it did not bleed. There was no erythema or drainage. Stability and range-of-motion testing of his knee was unchanged from previous testing. There was no effusion, and the patient reported 0/10 pain. The patient denied any fevers, chills, or night sweats. He denied any trauma to the knee. Radiographic evaluation revealed well-ingrown components without signs of failure. Inflammatory markers showed an erythrocyte sedimentation rate of 12 mm/h and C-reactive protein of 4.4 mg/L, not meeting cutoff criteria for aspiration. The presence of this lesion annoyed the patient, and he wanted it removed. Given the appearance and location of the lesion, the decision was made to move forward with surgical excision and send the tissue to pathology for diagnosis.

The patient was taken back to the operating room the following week. The entire area was excised in an elliptical fashion with margins and sent to pathology. There was healthy-looking subcutaneous tissue beneath the lesion, and there was no violation of the retinaculum. The area was then closed with 2-0 nylon in a tension-free manner. Standard dressings were used and maintained until his first postoperative appointment. The surgical pathology report was finalized a few days after surgery and revealed "well-differentiated KA." At his 2-week postoperative visit, the sutures were removed, and his incision was well healed without signs of infection (Fig. 2). He followed up with a dermatologist who recommended no further treatment and continues to be without recurrence nearly 1 year later (Fig. 3).

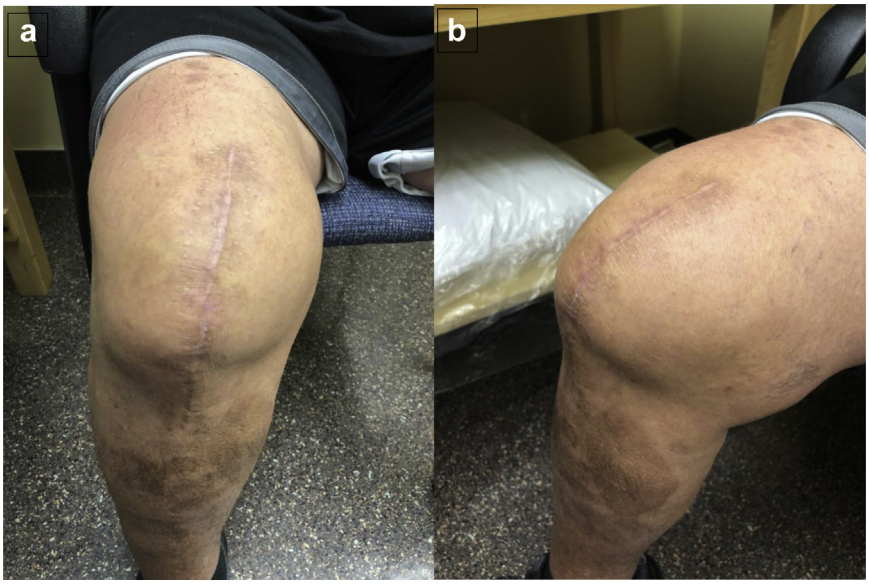

Figure 2. Picture of the patient's knee from the front (a) and side (b) 4 weeks after surgical excision of the squamous cell carcinoma, well-differentiated, keratoacanthomatous-type lesion.

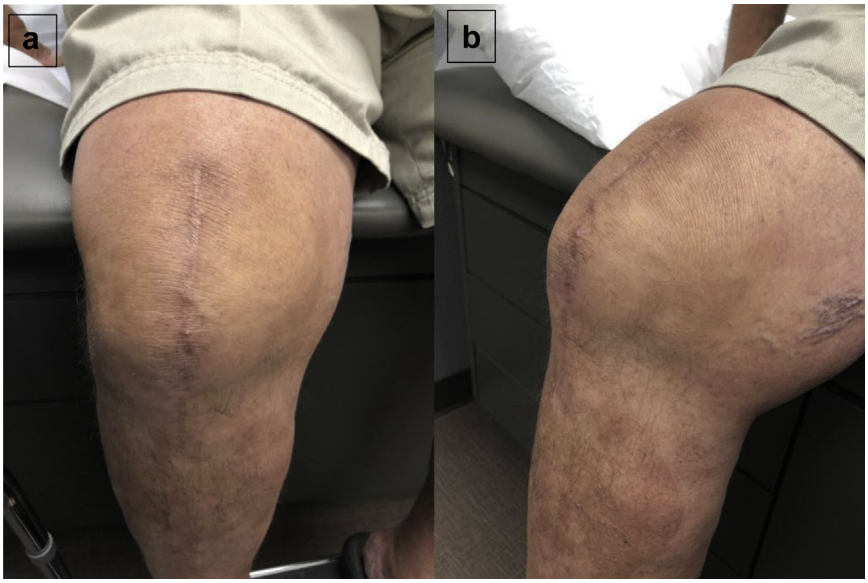

Figure 3. Picture of the patient's knee from the front (a) and side (b) nearly 1 year after surgical excision of the squamous cell carcinoma, well-differentiated, keratoacanthomatous-type lesion.

Discussion

SCC has previously been described to occur in various situations, some of which include traumatic scar lesions, skin graft donor sites, burn scars, and osteomyelitis [6-9]. KA typically presents as a rapidly growing, pink-skin-colored nodular growth with a central keratin plug. The exact origin of this growth is unknown. Prior literature has proposed ultraviolet-light exposure, genetics, carcinogens, immunosuppression, and trauma as etiologies [10]. Considered a variant of well-differentiated SCC, it is reported that up to 25% of KAs can undergo malignant transformation [5,11-13]. Pathologic differentiation between well-differentiated SCC and keratoacanthomas can be challenging. Various treatments include medical management, intralesional chemotherapy, curettage and destruction, and complete excision. Given the morphologic similarities to SCC, surgical excision is a common treatment [11].

Marjolin's ulcer, in contrast, typically refers to malignant transformation that develops within chronic wounds, typically burn scars [14]. Typical malignancies that occur include SCC, basal cell carcinoma, melanoma, and mesenchymal tumors [15,16]. They can be divided into acute, occurring in less than 1 year, or chronic [16]. Acute Marjolin ulcers are typically basal cell carcinoma, while chronic ulcers are typically SCC [16].

Our case report describes the development of KA that developed within the surgical incision a few months after an uneventful TKA. To our knowledge, there has been only one other case described where this has occurred after an arthroplasty procedure [17]. Warren and Jim described the case of an 80-year-old man who underwent an uneventful TKA [17]. At 6 weeks after surgery, he developed a raised lesion with a central crater within his surgical scar that was treated with surgical excision. The pathology report revealed a "well-differentiated keratinizing SCC." Our patient developed a similar lesion that was also treated with surgical excision, with the pathology report identifying the lesion as "well-differentiated KA." KA originating in surgical sites or due to trauma is relatively uncommon; however, the development of KA after Mohs micrographic surgery and excision of scars has been previously reported [18,19].

The topic of cancer after hip and/or knee arthroplasty is not a new idea. Previous reviews have looked at the incidence of sarcomas and hematopoietic cancers after arthroplasty and have shown that, although plausible, there is no obvious link [20]. In 2006, Visuri et al critically analyzed the western literature between 1974 and 2003 [21]. They found a total of 46 cases of malignant tumors developing after total hip arthroplasty of which the most were sarcomas (41/46). The total number of cases reported was extremely low when considering the total population involved. Fehring and Hamilton presented a case report of metastatic cholangiocarcinoma as the cause for a painful TKA, citing the importance of considering metastatic disease as part of the painful TKA diagnostic algorithm [22]. Metastasis has also been reported to occur in surgical scars. Buttaro et al [23] describes the case of a 60-year-old male who developed metastasis of a nodular SCC from a laryngeal source that presented as an infected sinus tract within a revision total hip arthroplasty incision 4 months after the procedure. These previous reports center around a metastatic disease associated with arthroplasty cases. Our case report adds to the literature highlighting primary carcinoma as a potential wound complication.

Summary

Although rare, the development of SCC or KA within the surgical incision after TKA should be considered in the differential diagnosis when postoperative soft-tissue complications occur. If diagnosed appropriately, surgical excision of KA with margins is a successful and viable treatment option.

Acknowledgments

Judith Barnes, Chi Library, McLaren Greater Lansing, Lansing, MI.

References

[1] Kahlenberg CA, Nwachukwu BU, McLawhorn AS, Cross MB, Cornell CN, Padgett DE. Patient satisfaction after total knee replacement: a systematic review. HSS J 2018;14:192.
[2] Kurtz SM, Ong KL, Lau E, Bozic KJ. Impact of the economic downturn on total joint replacement demand in the United States: updated projections to 2021. J Bone Joint Surg Am 2014;96:624.

[3] Lum ZC, Shieh AK, Dorr LD. Why total knees fail-A modern perspective review. World J Orthop 2018;9:60.
[4] Galat DD, McGovern SC, Larson DR, Harrington JR, Hanssen AD, Clarke HD. Surgical treatment of early wound complications following primary total knee arthroplasty. J Bone Joint Surg Am Vol 2009;91:48.
[5] Bernstein SC, Lim KK, Brodland DG, Heidelberg KA. The many faces of squamous cell carcinoma. Dermatol Surg 1996;22:243.
[6] Friedman R, Hanson S, Goldberg LH. Squamous cell carcinoma arising in a Leishmania scar. Dermatol Surg 2003;29:1148.
[7] Noori VJ, Trehan K, Savetamal A, Carter DW. New onset squamous cell carcinoma in previous split-thickness skin graft donor site. Int J Surg 2018;52:16.
[8] Soto-Dávalos BA, Cortés-Flores AO, Bandera-Delgado A, Luna-Ortiz K, Padilla-Rosciano AE. Malignant neoplasm in burn scar: Marjolin's ulcer. Report of two cases and review of the literature. Cir Cir 2008;76:329.
[9] Bauer T, David T, Rimareix F, Lortat-Jacob A. Marjolin's ulcer in chronic osteomyelitis: seven cases and a review of the literature. Rev Chir Orthop Reparatrice Appar Mot 2007;93:63.
[10] Pattee SF, Silvis NG. Keratoacanthoma developing in sites of previous trauma: a report of two cases and review of the literature. J Am Acad Dermatol 2003;48:S35.
[11] Beham A, Regauer S, Soyer HP, Beham-Schmid C. Keratoacanthoma: a clinically distinct variant of well differentiated squamous cell carcinoma. Adv Anat Pathol 1998;5:269.
[12] Gleich T, Chiticariu E, Huber M, Hohl D. Keratoacanthoma: a distinct entity? Exp Dermatol 2016;25:85.
[13] Yus ES, Simón P, Requena L, Ambrojo P, de Eusebio E. Solitary keratoacanthoma: a self-healing proliferation that frequently becomes malignant. Am J Dermatopathol 2000;22:305.
[14] Shen R, Zhang J, Zhang F, et al. Clinical characteristics and therapeutic analysis of 51 patients with Marjolin's ulcers. Exp Ther Med 2015;10:1364.
[15] Shahla A. An overview of heel Marjolin's ulcers in the orthopedic Department of Urmia University of Medical Sciences. Arch Iran Med 2009;12:405.
[16] Moonsamy P, Nazarian RM, Schulz JT, Goverman J. Acute Marjolin's ulcer arising in a split-thickness skin graft postburn injury. Eplasty 2016;16:ic31.
[17] Warren SB, Jim DA. Cutaneous neoplasm arising from total knee replacement incision in the early postoperative period. J Arthroplasty 2004;19:235.
[18] Goldberg LH, Silapunt S, Beyrau KK, Peterson SR, Friedman PM, Alam M. Keratoacanthoma as a postoperative complication of skin cancer excision. J Am Acad Dermatol 2004;50:753.
[19] Kimyai-Asadi A, Shaffer C, Levine VJ, Jih MH. Keratoacanthoma arising from an excisional surgery scar. J Drugs Dermatol 2004;3:193.
[20] Tharani R, Dorey FJ, Schmalzried TP. The risk of cancer following total hip or knee arthroplasty. J Bone Joint Surg Am 2001;83:774.
[21] Visuri T, Pulkkinen P, Paavolainen P. Malignant tumors at the site of total hip prosthesis. Analytic review of 46 cases. J Arthroplasty 2006;21:311.
[22] Fehring K, Hamilton W. Metastatic carcinoma as an unusual cause of knee pain after total knee arthroplasty: a case report. J Bone Joint Surg Am 2009;91:693.
[23] Buttaro MA, Guala AJ, Vigorita V, Piccaluga F. Nodular skin metastasis mimicking infection in a revision total hip arthroplasty scar. Clin Orthop 2007;465:257.