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ORIGINAL ARTICLE

The Keystone Flap in Dermatology: Clinical Experience with 18 Patients[☆]

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Colgajo de keystone;
Colgajo
fasciocutáneo;
Defectos cutáneos;
Miembros inferiores

Abstract

Introduction and objectives: The keystone flap is a fasciocutaneous flap supplied by perforating arteries. It is used in dermatology to repair surgical defects in areas with low skin extensibility (the upper and lower limbs and the back). We review the clinical experience gained with keystone flap reconstruction at our hospital and report on the surgical outcomes.

Material and methods: Descriptive retrospective study of patients with malignant skin tumors on the lower limbs who underwent keystone flap reconstruction.

Results: Eighteen patients (mean age, 77.83 years) underwent keystone flap reconstruction using the Behan technique in 17 cases and the modified Moncrieff technique in one. Basal cell carcinomas accounted for 38.8% of the tumors excised, squamous cell carcinomas 33.3%, and malignant pigmented tumors 27.7%. Cardiovascular risk factors were observed in 72.2% of patients. Minor complications occurred in 38.8% of patients, and there were no cases of partial or total flap necrosis.

Conclusions: We consider the keystone flap to be a good alternative to other flaps and grafts for the surgical reconstruction of lower limb defects. The success rate was high, and the cosmetic and functional outcomes were good.

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Aplicación del colgajo de keystone en dermatología. Experiencia clínica en 18 pacientes

Resumen

Introducción y objetivos: El colgajo de keystone es un colgajo fasciocutáneo cuya vascularización proviene de las arteriolas perforantes musculares. Su aplicación en dermatología es para cubrir defectos en zonas de piel poco distensible (miembros inferiores, superiores

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y de la espalda). Presentamos nuestra experiencia clínica y los resultados quirúrgicos del centro.

Material y métodos: Estudio descriptivo retrospectivo de pacientes con tumores cutáneos malignos en miembros inferiores en los que se realizó el colgajo de keystone.

Resultados: Se operaron 18 pacientes con una edad media de 77,83 años. Se realizaron 17 mediante la técnica propuesta por Behan y uno con la técnica modificada de Moncrieff. El 38,8% de los tumores extirpados fueron carcinomas basocelulares, el 33,3% carcinomas epidermoides y el 27,7% tumores malignos pigmentados. El 72,22% presentaba algún factor de riesgo cardiovascular. Se observó un 38,8% de complicaciones menores y ningún caso de necrosis parcial o total del colgajo.

Conclusiones: Consideramos que el colgajo de keystone es una buena alternativa terapéutica a otros colgajos e injertos para la reconstrucción de defectos en miembros inferiores. Los resultados estéticos y funcionales son buenos, con una tasa de éxito elevada.

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Introduction

The keystone flap was first described in 2003 by Behan¹ as an alternative to skin grafts and other flaps used to cover medium and large skin defects. The flap is a fasciocutaneous flap irrigated by vascular perforators. The name is borrowed from the architectural term *keystone*, referring to the central stone that supported the weight of Roman arches.

We present our clinical experience in the use of this flap to cover medium-sized defects on the legs.

Materials and Methods

In this descriptive, retrospective study, 18 patients with malignant skin tumors on the legs underwent keystone flap reconstruction. The technique was performed in the University Hospital Rey Juan Carlos, in Mostoles (Madrid), Spain between July 2013 and May 2017. No patient was excluded from the study. The clinical and demographic characteristics of the patients are described, along with the histopathological findings of tumor biopsy, the defect size, and associated side effects.

Technique

We performed 17 keystone flap reconstructions according to the classic Behan technique¹ (Figs. 1 and 2), and 1 according to the modified Moncrieff technique.² After application of mepivacaine 2% to the area as local anesthetic, local primary tumors were removed by fusiform excision and the flap was constructed, sparing the vascular perforators. From the anatomical area with greatest mobility, in most cases from the posterior compartment of the leg, a flap of the same width as the defect was marked. Each corner of the flap formed a 90° angle. The final shape of the flap was an arched trapezoid like a keystone. Simple suture was used with nonresorbable 3/0 and 2/0 stitches. In some cases, V-Y advancement of each end of the flap was needed for full closure.

In the case of the modified keystone flap procedure, partial dissection only was performed of the arch, leaving a central area of healthy skin that contributed to dermal vascularization.

All surgical procedures were performed in the outpatient setting; admission to hospital was not required for any patients.

As these flaps required substantial tension, a regimen of 7-10 days of antibiotics was started after surgery. Amoxicillin-clavulanic acid was the treatment of choice if there were no contraindications. Patients were recommended relative rest, and no antithrombotic prophylaxis was required.

In all cases, the first dressing change was performed in hospital 48-72 hours after surgery to ensure flap viability. The stitches were removed after 14-18 days. The duration of patient follow-up varied depending on the malignant tumor that had been excised.

Results

A total of 18 flap procedures were performed (Table 1). Twelve of these were in women and 6 in men (ratio 2:1). The oldest patient was aged 95 years and the youngest 59 years, with a mean age of 77.83 years. The malignant tumors excised were as follows: 7 basal cell epitheliomas, 6 squamous cell carcinomas, and 5 malignant pigmented tumors (malignant melanoma, lentigo maligna, and lentigo maligna melanoma). All lesions were located on the legs.

The largest lesion excised was 2.5 cm in diameter (6.25 cm²) and the smallest 0.8 × 0.7 cm (0.56 cm²), with a mean area of 2.98 cm². The maximum resulting defect size after flap design was 7.6 × 3 cm (22.8 cm²) and the minimum defect size was 3.2 × 2 cm (6.4 cm²), with a mean area of 12.74 cm².

Regarding comorbidities in these patients, 13 (72.2%) had cardiovascular risk factors, 46.15% had diabetes, and 100% had hypertension. One patient had had at least one episode of ischemic heart disease and another had had cerebrovascular accident (15.38% of the total). Two patients

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