Deformity of Buttonhole Entry Site Causes Higher Frequency of Vascular Access-Related Infection

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Introduction

With long-term buttonhole cannulation, skin around the opening of the tunnel track is elevated and the central portion of the buttonhole entry site is depressed, resulting in a bulging deformity of the entry site.

Looking carefully at this image may give the impression that it would be difficult to sufficiently disinfect the depressed central portion where the opening of the Buttonhole track exists. Thus, we surmised that such a bulging deformity is the cause of access-related infection.

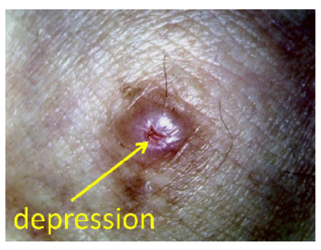

Figure1 Bulging deformity of button -hole entry site(enlarged photo of a buttonhole entry site)

Methods and Results

In a microscopic image of the buttonhole entry site, granulation was observed around the buttonhole track and beneath the skin at the buttonhole entry site. Moreover, the skin was proliferated in the granulation area. These observations suggest that the bulging deformity comprises hypertrophic granulations formed under the skin of the entry site.

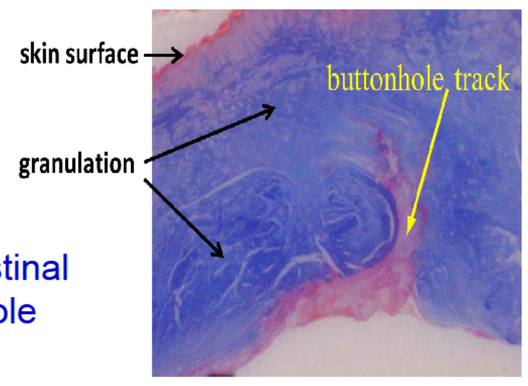

Figure 2
Microscopic image of a buttonhole entry site tissue
(This patient died from a gastrointestinal hemorrhage after receiving buttonhole cannulation for 3 years.)

To examine if a bulging deformity is the cause of access-related infection, a multivariate logistic regression analysis was performed at 320 buttonhole entry sites of the 166 patients. We used vascular access-related infection occurring for the past 18 months as the dependent variable and existence of bulging deformity as one of the independent variables.

The analysis showed that there was a significant association only between a bulging deformity of the buttonhole entry site and occurrence of access-related infection. There was no significant association between vascular access-related infection and the rest of the independent variables.

table I Results of multivariate logistic regression analysis

variables	odds ratios	p value
gender (male=1)	0.408	0.2667
age (every 1 year)	0.987	0.6333
years on hemodialysis (every 1 year)	1.032	0.6296
months on buttonhole method (every 1 year)	0.980	0.4091
diabetes	1.685	0.4042
artificial vessel access (native=1)	0.794	0.9558
superficialized artery access (native =1)	0.351	0.7408
cannulation site (arterial site=1)	1.772	0.3383
depressive deformity (no deormity=1)	0.611	0.8369
bulging deformity (no deformity=1)	5.369	0.0085
intercept = -3.3304		

Deformation of the entry site is a long-term result. Therefore, if the cause of access-related infection is a bulging deformity of the buttonhole entry site, frequency of such infections will increase after significant time has elapsed from creation of the buttonhole track.

According to Dr. Toma, frequency of access-related infections was almost constant for 6 years after buttonhole cannulation was started.

Dr. Labriola studied the impact of staff re-education workshops on hygiene protocols

Careful examination of this Labriola paper reveals that the frequency of access-related infections was rather low for almost 1 year after the switch from the rope-ladder method to the buttonhole method. The frequency started to Increase thereafter.

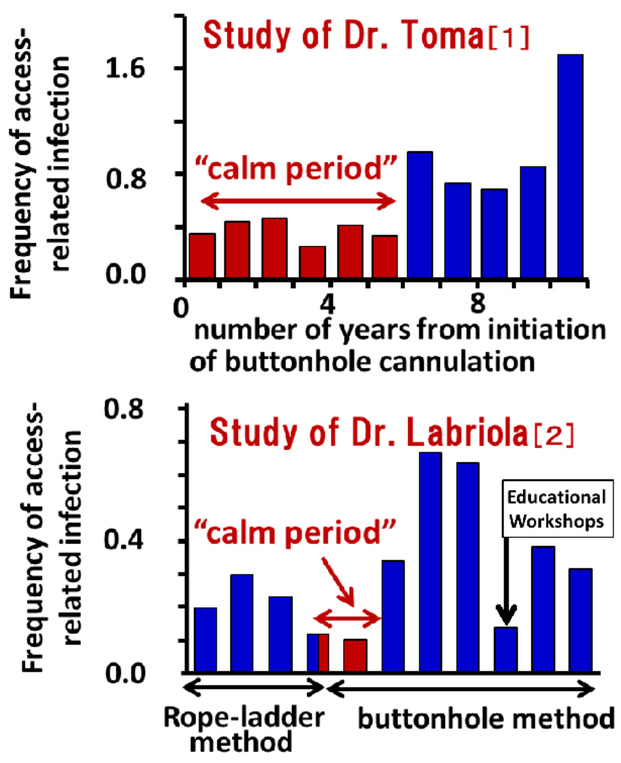

Figure 3 Frequency of access-related infections and time elapsed from creation of the buttonhole track

Discussion

Hypertrophic granulation may be formed by repeated physical stimuli to the same portion of the skin.

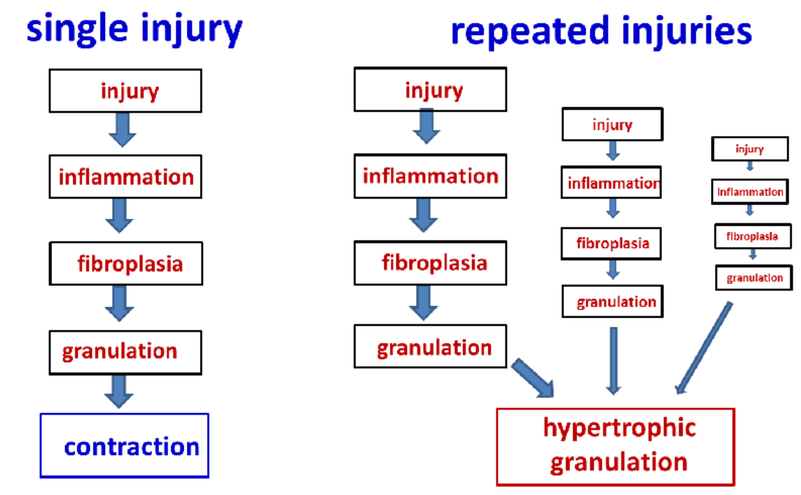

Figure 4 Cascade of events initiated by injury to the skin

Countermeasures to prevent access-related infection

Creation of a new buttonhole tract whenever a bulging deformity becomes prominent.

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