

The Later Life of the Diabetic Amputee

Another Look at Fate of the Second Leg

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SUMMARY

Studies were made of sixty-seven diabetic patients who had lost one leg to gangrene. At the time of the study, forty-seven were dead and twenty lived. Only five patients in the former group and four in the latter had lost their "second leg." Early death from the effects of a generalized arteriosclerotic process accounts for the small number of double amputees. A diabetic amputee will probably lose his life before he loses his "second leg." *DIABETES* 17:520-21, August, 1968.

Stimulated by Goldner's observations on "The fate of the second leg"¹ we reviewed the course of eighty patients, seventy-eight with diabetes, who underwent below-knee amputation for gangrene between 1956 and 1965. This was done to confirm our impression that most of these patients succumbed to the mortal complications of arteriosclerosis before losing their remaining leg.

Only four of the seventy-eight patients studied were under fifty years of age at the time of the amputation. The majority of patients used insulin daily. Seven patients had a previous leg amputation; thus, the below-knee amputation in these seven was, in effect, a loss of the second leg. The remaining seventy-one patients (forty-one men and thirty women) represent the group discussed below. All were operated by the same surgeon, (M.A.B.), and had below-knee amputations for standard indications, i.e., extensive gangrene, uncontrolled pain or uncontrollable infection. Often more than one indication for surgery existed concomitantly. Figure 1 summarizes our eighty patients.

RESULTS

1. *Follow up on seventy-one patients (figure 1:III).* Twenty patients were alive in 1966. We examined or heard from all within this calendar year. Four patients failed to respond to follow-up letters. The remaining forty-seven patients had died. Cardiovascular, renal or cerebral complications of diabetes and arteriosclerosis killed forty-two patients; five died of cancer.

2. *Analysis of the postoperative course of these forty-seven patients (figure 1:V-VI).* Five patients required an amputation

of the remaining leg, ranging in time from one to seven years after the first operation. Four of these amputations were below-knee procedures. Two of five had used an artificial leg prior to the second amputation. These five double amputees died from one to five years after the second operation. Forty-two patients died before losing their "second leg." Five died of cancer; the rest died from the complications of arteriosclerosis. While twelve were walking with a prosthesis at the time of their final illness, twenty-four either used no prosthesis or purchased one but were unable to use it. Insufficient information was available on six patients. Thirty-three of these forty-two patients died within three years of their amputation, clearly indicating why so few of our patients lost their second leg.

3. *Analysis of twenty patients still alive in 1966 (figure 1:V-VI).* Four lost their second leg from one to six years after the first operation. All four used an artificial limb after the first operation. Two are now successfully using two prostheses. Of the sixteen patients who live without loss of the second leg, nine have used a prosthesis from four to eight years. Seven are too infirm for rehabilitation and live a wheelchair life. Often severe cerebrovascular disease prevented adequate gait training.

4. *Life expectancy in our sixty-seven amputees.* By using the life-table approach (table 1)² we have calculated the proportional survival of our amputees for the first three post-operative years, then biannually for the next three periods.

I	80 PATIENTS			
II	78 diabetic			2 non diabetic
III	71 first B.K. amp.			7 2nd. amp.
IV	67 adequate follow up			4 no follow up
V	20 alive 1966		47 not alive 1966	
VI	4 2nd. leg	16 only one amp.	42 only one amputation	5 2nd. leg

FIG. 1. Summary of eighty patients with below-knee amputations, 1956-1965.

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TABLE 1
Survival of diabetic amputees

Interval after amputation (years)	No. observed	No. last observed and alive in interval between first observation and next stated period	No. dying in interval between first observation and next stated period	Estimated proportion of amputees who:		Proportion of surviving amputees
				A Died before next-stated period	B Survived to next stated period	
0	67	0	7	.1045	.8955	—
1.0	60	0	16	.2667	.7333	.895
2.0	44	4	10	.2381	.7619	.656
3.0	30	9	7	.2745	.7255	.500
5.0	14	3	5	.4000	.6000	.363
7.0	6	1	2	.3636	.6364	.198
9.0	3	—	—	—	—	.126

Column 5A indicates that about one in four amputees died per period examined. Column 6 portrays the proportionate survival of these sixty-seven amputees, emphasizing the steady mortality of these patients and again indicating that death is a far greater hazard than is loss of the other leg.

DISCUSSION

Since arteriosclerosis is a bilateral disease, Goldner¹ correctly emphasized the danger of a diabetic patient losing his second leg after having lost the first from ischemia and its complications. We wish to underscore the greater likelihood of a diabetic losing his life before he loses his remaining leg. Of forty-seven patients (70 per cent) who are dead, five of these (11 per cent) lost their "second leg" before their lives; of twenty patients who still live, only four (20 per cent) are

double amputees.

Arteriosclerosis obliterans with gangrene is one manifestation of a generalized ischemic process which intensely affects many diabetic patients. Though limb involvement with amputation often is invaliding, ischemia involving other sites, viz., heart, brain, kidneys, poses a greater threat to the patient's life. The present observations indicate that a single amputee with diabetes is more likely to lose his life to one of these complications than to lose his "second leg."

REFERENCES

- 1 Goldner, M. G.: The fate of the second leg in the diabetic amputee. *Diabetes* 9:100-03, 1960.
- 2 Merrell, M., and Shulman, L.: Determination of prognosis in chronic disease. *J. Chronic Dis.* 1:12-32, 1955.