

Functional Outcomes and Prognostic Factors in Patients with Bilateral Transtibial Amputation (BTTA)

†H. Mac Neill BSc(PT), MD, FRCPC

*^M. Devlin MD, FRCPC

^T. Pauley, MSc, PhD(candidate)

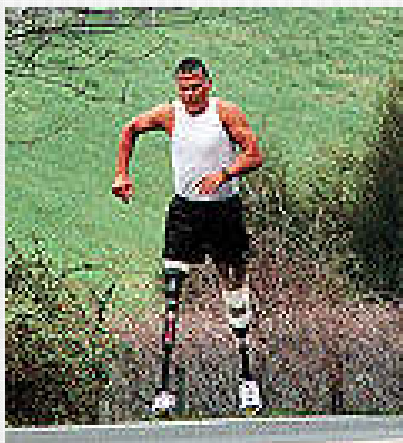
Alexandra Yudin, MD

† Bridgepoint Hospital, Toronto, Ont.

*Physiatry, University of Toronto

^West Park Healthcare Centre, Toronto, Ont.

Definition of Inspirational?



Quick survey...

- Who works directly with patients who have BTTA?
- What percentage of LE amputees that you follow are bilateral LE amputees?
 - 1-10%, 11-20%, 21-30%, >30%
- Of transtibial amputees referred to rehab, who do you think would have better outcomes?
 - Unilateral? Bilateral?
 - By what margin? Small /moderate/ large?

Today's Objectives

- To consider which patients with bilateral transtibial amputations will likely fair well in rehabilitation, and prognostic factors related to this

Background

- Most amputations due to PVD or diabetes(DM) which are systemic diseases, 15-35% of unilateral amputees become bilateral. Mean survival time is varied, ~5 yrs, up to 9 yrs
- Knee preservation is paramount to successful outcomes- this is especially true in the bilateral amputees
 - 60-90% success rate for BBKA (pre-selected pop.)
 - 0/40% for BAKA (non-traumatic/ traumatic)

Background

- Unilateral vs. BBKA rehab outcome:
 - Unilateral- may have more anxiety/ depression over process, no previous education/experience/training
 - Bilateral- higher O_2 consumption (9 vs. 123%), decreased proprioception, more advanced disease/ co-morbidities/ stump probs, older

Study Objectives

BBKA population due to DM or AS causes:

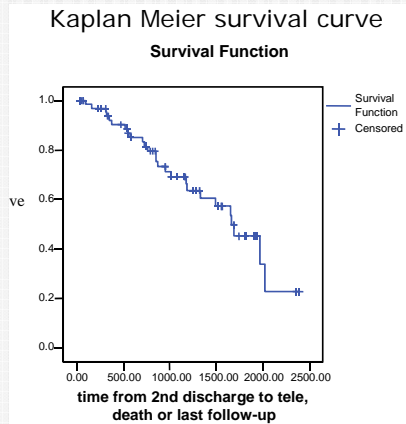
1. Degree of success in 1st prosthetic rehabilitation compared to the 2nd
 2. Success of BBKA rehabilitation as measured by valid and reliable objective outcome measures
 3. Prognostic factors related to success in bilateral prosthetic rehabilitation
 4. Long term outcomes of BBKA pts
- Most studies to date have been mixed populations with small numbers and vague and varied outcome measures

Methods

- Convenience sample of 82 consecutive diabetic or vascular BBKA admitted for WPH for prosthetic and non-prosthetic rehabilitation between 1998 and 2004.
- Retrospective database analysis and confirmatory chart review of both rehabilitation admissions (uni vs. bilat)
- Telephone interview/ regularly scheduled clinic visits

Results

- M=73%, F=27%
- Age at 2nd rehab admission= 65.5 yrs
- Mean time between amputations=2.96 yrs
- Mean survival time after 2nd BKA (Kaplan Meier)= 4.2 yrs (takes into account allcomers to study)



Co-morbidity	Unilateral BKA Admission (n=74)	Bilateral BKA admission (n=82)
stroke	8 (10.8%)	13(15.9%)
RA/OA	6 (8.1%)	7 (8.5%)
Cardiac-CHF	16 (21.6%)	26 (31.7%)
Cardiac-IHD	8 (10.8%)	10 (12.2%)
CAD	38 (51.4%)	53 (64.6%)
COPD	6 (8.1%)	12 (14.6%)
Renal Failure	9 (12.2%)	13 (15.9%)
Impaired vision	30 (40.5%)	39 (47.6%)
Cognitive limitation	6 (8.1%)	10 (12.2%)
Behavioral limitation	3 (4.1%)	3 (3.7%)
PVD	68 (91.9%)	77 (94.0%)
IDDM	12 (16.2%)	15 (18.3%)
NIDDM	56 (75.7%)	61 (74.4%)
Obesity	5 (6.8%)	12 (14.6%)
Depression/ anxiety	2 (2.7%)	7 (8.5%)
other	21 (28.4%)	27 (33.0%)

Results (matched data available)

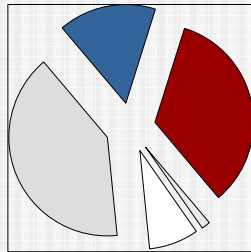
	(BKA) 1 st admission	(BBKA) 2 nd admission	
Prosthetic candidacy	93.5%	84.1%	NS, n=77
Discharge Houghton	4.69	4.46	NS, n=26
Discharge 2 min walk	44.74m	34.58m	NS, n=9
SF-12 PCSa/MCSa	24.1/ 39.3	29.6 / 42.6 (PCS better at 2 nd)	P=.047/NS, n=12
Number co-morbidities	4.12	4.71	P<0.01 n=74
Length of stay	39.24 days	40.71 days	NS, n=74

Results

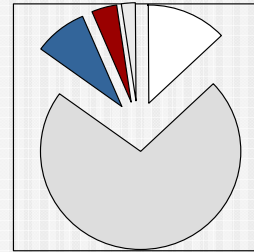
- Also, non-matched data → NS for 2mw, Houghton, SF12
- 91.7% vs. 93.8% transfer indep (NS)
- 95.8% vs. 93.6% indep in basic ADL's (eating, grooming, dressing) (NS)
- NS diff in discharge destination
- However,
 - "indep in ambulation" based on chart extraction was 73.2% vs. 89.2% (P=0.02 for matched data, n=74)
 - Gait aid used at discharge...

Discharge walk aid

1st admission



2nd admission



Prognostic factors

- Age-
 - NS for SF12, pc, LOS, assistance
 - Signif for 2MW, discharge Houghton
- Sex
 - NS for pc
 - Signif or trend for discharge Houghton, 2MW, assistance required and LOS

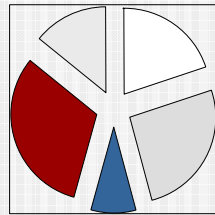
Prognostic factors

- Time between amputations (practice time)
 - Not a factor, however those with simultaneous rehab process had initial signif discharge Houghton scores that were NS at long term f/u
- # co- morbidites Not a factor for pc
- Depression/anxiety rarely reported in either admission

Telephone Interview

- 35 pts-3.3 yrs from 2nd amp
- NS diff between those interviewed and those LTFU or dead (age,sex, outcomes)
- Only 6% (2) abandoned due to co-morbidities
- 85.7% (30) wore, 74% all waking hrs,
- 82.9% indep indoors, endurance limited (219.3 m) due to balance/fatigue

Telephone Interview



□ Wheelchair
□ walker
■ crutches
■ cane(s)
□ unaided

- Houghton improved 6.3 ($p=.001$), gait aid ($p=.008$)
- SF12 (NS change)
- Frenchay= 16.87/45, social outings 1/wk correlated with MCS at telephone f/u
- 72.2% walking prior to their passing

Conclusions

- 84.1% were prosthetic candidates, majority continue to wear at LTFU
- Similar discharge outcomes- uni vs. bilat
- Possibly less quality of gait (gait aid), but no change in prosthetic wear (Houghton)
- High mortality rate, but live 4.2 yrs after amputation on average
- Maintain independence in basic ADL's, but may lose iADL's, leisure, social fnc (based on FAI)

Conclusions

- Patients referred to rehabilitation for bilateral transtibial amputation rehabilitation have similar outcomes to how they fared as a unilateral transtibial amputee and therefore should be given similar prosthetic consideration

Houghton scale

- Self reported prosthetic use scale (total=9?)
- Found to be valid, reliable and responsive to change in amputee population (Devlin et al, Archives, 2004)
- Correlated to the SF36 and 2mw
- Does not look at QOL, satisfaction or ADL
- No difference found between unilateral and bilateral amputees in previous study
- Modified Houghton (q1-3 only) used as found to be more responsive to change with no signif diff in validity and reliability

Frenchay Activities Index

- Self-reported 15 item scale on the frequency (not quality) of participation in iADL, leisure and social function, max=45
- Found to be valid and reliable in unilateral amputees
- FAI discriminated by amp etiology, gait aid, age and number of years as amputee, but not by amp level or gender
- ICC=0.79, caution with interpreting individual data

1. Clin Rehab 2004;18:414-422

Frenchay Activities Index

- Mean score 16.87 (max. score 45) on telephone
 - Mean score of unilat, mainly traumatic amputees previously reported at 29.1 (Miller, 04), and 16.8 for elderly unilateral LE Amp (Datta, 96)
 - Mean score of 11.3 in handful of BBKA prosthetic users, 5.0 in non-users (stat signif diff) (Datta, 92) No difference b/t users/nonusers in our study
 - Reported clinically important cut-off of 20 (subjective reports in amp population)

SF-12

- Self-reported 12 pt scale on QOL related to perceived mental and physical health
- SF-36 Often used as a gold standard for QOL measures(SF 12 less studied)
- Not disease specific, therefore any impairment scores can be compared
- PCS found to correlate with other physical constructs of the Orthotic and Prosthetics National office Outcomes Tool and to Houghton
- US population means=50 (SD+/-10), higher scores better. Age matched scores available
- Total score 0-100

2 minute walk (Brooks et al, 2001)

- found to be responsive to change in lower extremity amputees
- correlated to measures of physical functioning component of the SF36 (but not the PCS or MCS score) and prosthetic use (as measured by the Houghton).
- There was also significant differences in the 2mw between gender, with males fairing better, and age.
- Reliability and predicitive validity still need to be established

Background (previous research)

- Successful unilateral use correlates with bilateral use (ability +/- time to become unilateral user)
- Time between amps may be a factor
- Medical problems most often caused long term discontinuation of prosthetic use
- Controversial factor to outcome: age
 - Most include all bilat lower extremity amputees (BLEA) of different etiologies
 - retrospective chart review +/- form/interview, small numbers
 - Most looked at prosthetic use and mobility only, outcome measures vague and varied