UNIVERSITÄTS KLINIKUM HEIDELBERG

VEITHsymposium — Connecting The Vascular Community

AIM AVID

Cancer incidence after lower extremity bypass surgery in patients with CLTI

How affect cancer outcome?

Why the relationship with cancer exists?

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Disclosures

- Consultancy
  - Arsenal, Arterica, BrainLab, Cook, Endologix, Gore, Medtronic, Philips
- Research grant /research support
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- Advisory Board
  - BrainLab, Endologix, Gore, Medtronic, Philips
- Paid speaker
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- Major stokeholder
  - none

No Conflicts of Interests

Cancer Incidence after Vascular Procedures

Long-term outcome and cancer incidence after abdominal aortic aneurysm repair

Ettengruber A, Böckler, Grundmann et al Langenbecks Arch Surg 2022

Long-term outcome and cancer incidence after lower extremity bypass surgery in patients with critical limb threatening ischemia

- 27 % develop cancer after AAA treatment
- Cancer worsened longterm outcome after EVAR & OR

10 Year Mortality in Patients with PAOD

Ten Year Mortality in Different Peripheral Arterial Disease Stages: A Population Based Observational Study on Outcome

Fredrik Sartipy, Birgitta Sigvant, Fredrik Lundin, Eric Wahlberg

EJVES 2018;55:529-36

10 yr. mortality in CLTI pat.	75%
# 1: myocardial infarction	28 %
# 2: stroke	26 %
# 3: cancer	15 %

- no data on cancer incidence after treatment

Background on CLTI

- Treatment endpoint in the Tx of CTLI is amputation free survival [1]
- Leading cause of mortality in pat. with CLTI is cardiovascular death [2]
- Population based studies report cancer incidence of 16% [3]
- PAOD patients are more frequently smokers > potentially higher risk for cancer
- Cancer incidence after revascularization is unknown

[1]Conte M et al, ESVX Guidelines, EJVES 2019, [2] Steg PG, JAMA 2007 [3] Sartipy F, EJVES 2018 .

Purpose of the study

to analyze

- incidence of cancer development after lower extremity bypass surgery
- impact of cancer on longterm outcome of cancer development

in cancer-free patients with CLTI (Rutherford Class 3-5)

living in Germany

Material & Methods

- Retrospective secondary analysis based on anonymized data from the largest health- insurance company in Germany (AOK, market share 37%) .
- **21.082 patients** with CLTI underwent infrainguinal bypass surgery
- Enrollment between January 2010 and December 2015
- All patients were initially **cancer – free**
- Endpoints: malignancy incidence after BP surgery and survival
- Comparison between Rutherford Category 4 and Category 5 & 6

Limitations of this study

- National study (Germany) - not transferrable to other countries
- Results not necessarily representative for entire Germany
  - because data reflect patient characteristics of one health insurance company (social structure)
- Completeness of data sets depends on coding quality
- Causes of death, amputation rates and cancer stages could not be determined
- No data on endovascular preocedures available

Patient Demographics

Patients ($n = 21{,}082$)	Rutherford 4, n= 5631	Rutherford 5&6, n=15.451	p-value
Patient characteristics and comorbidities			
Men, n (%)	3606 (64%)	9780 (63.3%)	0.324
Women, n (%)	2025 (36%)	5671 (36.7%)	0.324
Age, MW ± SD			<0.001
Age men, MW			<0.001
Age women, M			<0.001
CHD, n (%)			0.216
Myocardial infa			0.038
Cerebral infarct			0.757
Intracerebral he			0.255
TIA, n (%)			0.199
Arterial hyperte			0.006
Dyslipoproteina			<0.001
Diabetes mellitu			<0.001
COPD, n (%)			0.733
Left heart failur			<0.001
Chronic kidney			<0.001
Perioperative outco			
Length of hospi			<0.001
Perioperative m			<0.001

Chronic kidney dis...

PAD peripheral artery disease, *TIA* transient ischemic attack, *CHD* coronary heart disease, *COPD* chronic obstructive pulmonary disease

Rutherford 4 patients vs. 5&6 were:

- ✓ Older
- ✓ more diabetic (39 % vs. 23%)
- ✓ more heart and renal insufficiency (20% vs. 12%)
- ✓ higher perioperative mortality (10.1 % vs. 4.4%)

Cancer Incidence

Patients	Rutherford 4. ($n = 5631$)	Rutherford 5 & 6 ($n = 15{,}451$)	p-value
Cancer incidence	25.7%	25.5%	0.421
Cancer incidence in patients < 70 years	22.9%	24.2%	0.405
Cancer incidence in patients > 70 years	26.9%	26.3%	0.902
Cancer incidence in men	30.2%	30.3%	0.799
Cancer incidence in women	16.9%	15.9%	0.311
Abdominal cancer incidence	11.1%	11.6%	0.531
Abdominal cancer incidence in patients < 70 years old	9.1%	9.6%	0.897
Abdominal cancer incidence in patients > 70 years old	13.2%	13%	0.850
Abdominal cancer incidence in men	14.6%	14.5%	0.712
Abdominal cancer incidence in women	4.5%	5.9%	0.051

PAD peripheral artery disease

Most commonly cancers found in CLTI Patients

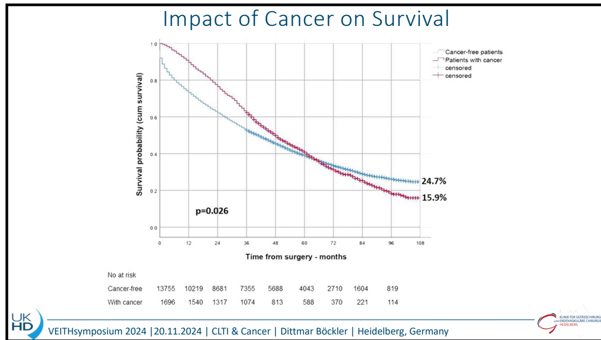
Cancer (ranked)	Male	Female	*p*-value
Lung	9 %	3.9 %	< 0.001
Skin	4.2 %	1.8 %	< 0.001
Breast	0.1 %	3.6 %	< 0.001
Prostate	3.8 %	-	
Colon	3.8 %	1.8%	< 0.001
Renal and Bladder	3.5 %	0.9 %	< 0.001

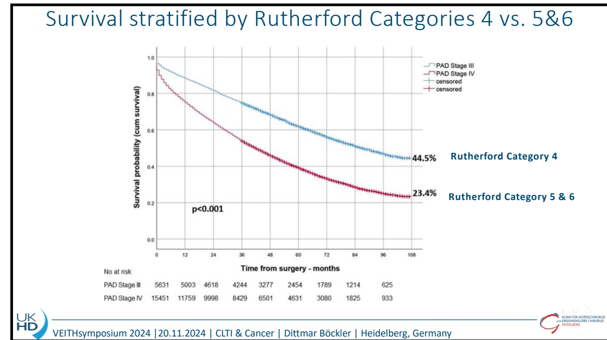
Risk Factors for Cancer

Hazard ratio (HR) and proportional hazard model (multivariate analysis)

Covariates	HR1.399	95% CI	*p*-value
Men (vs. women)	1.885	1.714-2.073	< 0.001
Age > 70 yrs	1.399	1.285-1.522	< 0.001
Rutherford (...IV	1.035	0.951-1.127	0.422
Diabetes mellitus	0.861	0.786-0.943	0.001
COPD	1.397	1.236-1.578	< 0.001

HR Hazard Ratio, *CI* confidence interval, *COPD* chronic obstructive pulmonary disease





Summary of Results

- 26 % developed cancer after a FU period of 9 years
- Significant higher incidence in male (30 %) compared to female (16 %)
- Rutherford 4: No difference between cancer & cancer-free survival @ 32 mths.
- Better survival of Rutherford 4 compared to Rutherford 5&6 (45 % vs 23.4%)
- Cancer-free Rutherford 4 pat. showed better survival than with cancer (47 vs.30%)
- Rutherford 5&6 showed no difference in survival between cancer and cancer

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Conclusions

- Cancer incidence after BP Surgery for CLTI is 26%
- Gender matters: men have higher cancer incidence than women
- Most common is lung cancer – potential relationship to smoking
- Cancer affects longterm outcome with significant lower survival rate in Rutherford 5 & 6 patients

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