Osteomyelitis following mandibular reconstruction with free fibula flap: a cohort study of an emerging and complex bone and joint infection

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Conflicts of interest

No conflict of interest

Introduction (1)

- **Free fibular flap (FFF) in head and neck cancer surgery**
- **Surgical site infections (SSI) in 13-41%**[1-3]
  - Clean contamined field
  - Patient's comorbidities
- **Serious complication, osteomyelitis and flap loss**
- **No management consensus**
  - Bone and prosthetic joint infections recommandations[4]

[1]Lin et al. Eur Arch Otorhinolaryngol. 2018,[2]Karakida et al. J Infect Chemother. 2010, [3]Yarlagadda et al. Head & Neck 2016, [4]Hip & Knee – ICM Philly, second international consensus meeting on musculoskeletal infection, 2018.

Objectives

- **Retrospective single-center cohort study**
  - Diagnosis, clinical, microbiological features and management description
  - Treatment outcome

- **Sept 2012 – July 2019**

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Definitions

- **Proven infection**
- **Timing:** early (< 3 months), delayed (3-12 months) and tardive infection (> 12 months), acute vs chronic infection[6]
- **Treatment failure :** persistance, relapse, need for additional surgery, flap loss and/or death

[6]Kapadia et al. Lancet 2016

Results (1): Baseline characteristics

48 patients included

Baselines characteristics	Total population n=48	Favorable outcome n=24	Treatment failure n=24	*p*-value
Sex (male)	30 (62.5%)	16 (66.7%)	14 (58.3%)	0.551
Age (year)	60.5 (52.4-66.6)	61.7 (52.2-68.1)	59.6 (52.4-64.2)	0.386
ASA score	2 (2-2)	2 (2-2)	2 (2-2.8)	0.374
Charlson comorbidity index	2 (2-3)	2 (2-3)	2 (2-2)	0.262
Active tobacco consumption	14/47 (29.8%)	8 (33.3%)	6 (26.1%)	0.587

Table 1 patients baseline characteristics

Results (1): Baseline characteristics

Underlying mandibular condition	Total population n=48	Favorable outcome n=24	Treatment failure n=24	*p*-value
Carcinoma	27 (56.3%)	11 (45.8%)	16 (26.7%)	0.146
Osteoradionecrosis	12 (25.0%)	9 (37.5%)	3 (12.5%)	0.093
Osteomyelitis	7 (14.6%)	3 (12.5%)	4 (16.7%)	1.000
Others	6 (12.5%)	2 (8.3%)	4 (16.7%)	0.666

Previous radiotherapy 82,9 %

Table 1 patients baseline characteristics

Results (2): Diagnostic features – TIMING

- **Infection timing**
  - 43 (89,6%) early vs 5 (10,4%) delayed infections
  - 22 (45,8%) acute infections
  - No statistical difference

Results (2): Diagnostic features – CLINICS

Clinical features	Total population n=48	Favorable outcome n=24	Treatment failure n=24	*p*-value
Fever	17/47 (36.2%)	7/24 (29.2%)	10/23 (43.5%)	0.307
Local inflammation	28/47 (59.6%)	15/24 (62.5%)	13/23 (56.5%)	0.676
Pain	11/47 (23.4%)	6/24 (25.0%)	5/23 (21.7%)	0.792
Ununion-sinus tract	28/47 (59.6%)	13/24 (54,2%)	15/23 (65.2%)	0.440
Bone/device exposure	21/47 (44.7%)	9/24 (37.5%)	12/23 (52.2%)	0,312
Purulent discharge	31/47 (66.0%)	16/24 (66.7%)	15/23 (65.2%)	0.917
Abscess	22/47 (46.8%)	11/24 (45.8%)	11/23 (47.8%)	0,891
Delayed wound healing	21/47 (44.7%)	8/24 (33.3%)	13/23 (56.5%)	0.110

Table 2 infection features

Results (2): Diagnostic features – IMAGING

Radiological findings	Total population n=48	Favorable outcome n=24	Treatment failure n=24	*p*-value
Radiological infection signs	33/44 (75.0%)	15/22 (68.2%)	18/22 (81.8%)	0.488
Bone lysis	15/44 (34.1%)	5/22 (22.7%)	10/22 (45.5%)	0.203
Pseudarthrosis	8/44 (18.2%)	2/22 (9.1%)	6/22 (27.3%)	0.240
Implant migration	12/44 (27.3%)	4/22 (18.2%)	8/22 (36.4%)	0.310
Abscess	21/44 (47.7%)	10/22 (45.5%)	11/22 (50.0%)	1.000

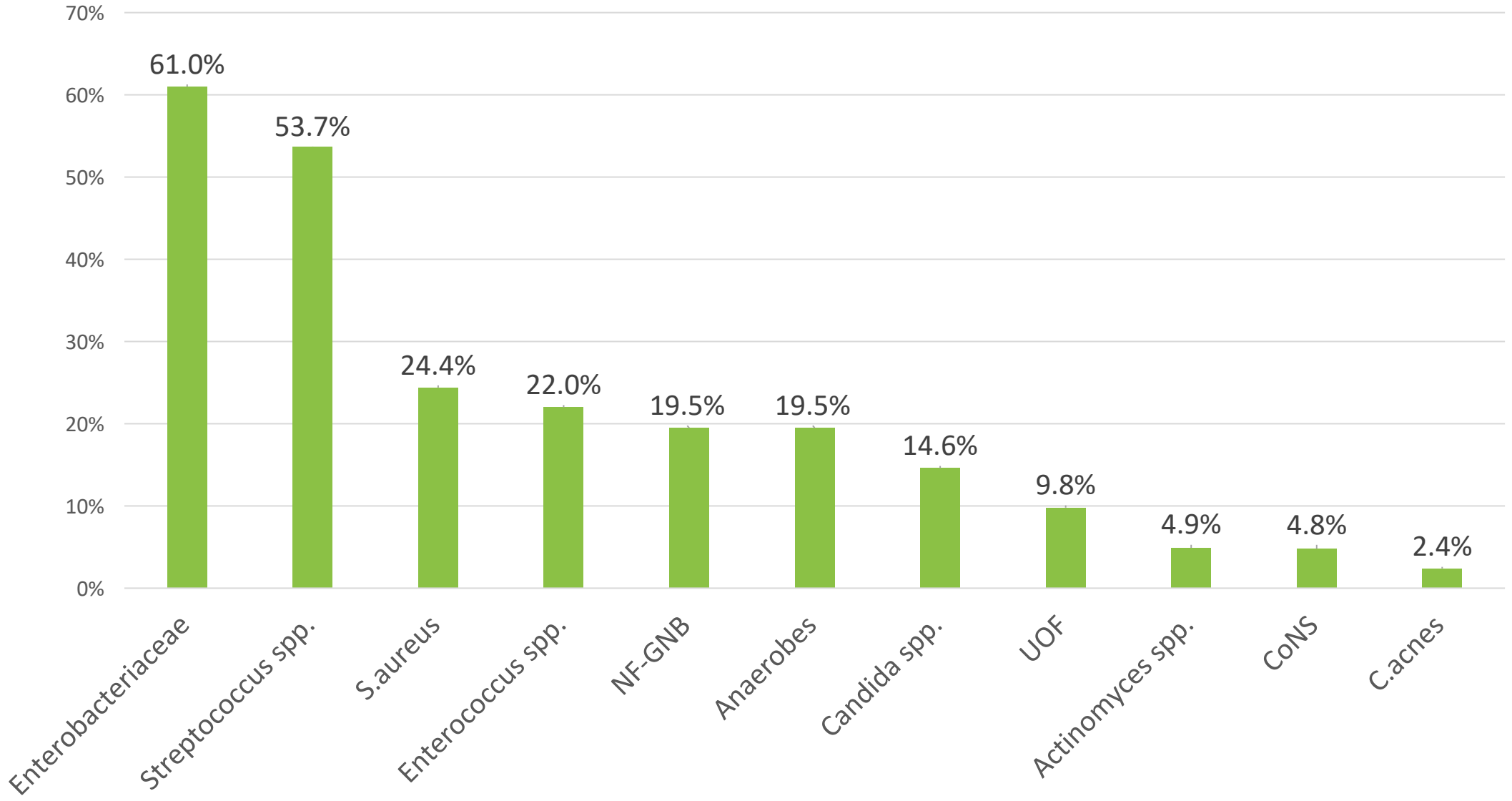
Table 2 infection features

Results (2): Diagnostic features – BIOLOGY

- **Histopathological analysis in 50%**
  - 54.4% infection signs
- **Microbiological findings**[7]
  - 41/48 (85,4%) gold standard samples
  - 97,6% documented infection
  - Polymicrobial documentation

[7]Osmon et al. Clin Infect Dis. 2013

Results (2): Diagnostic features - MICROBIOLOGY



Results (3): Infection management

- **Revision surgery in 39/48 patients (81.3%)**
  - Debridement with implant retention in 51.2%
  - Complete device exchange in 2.1%
  - Device removal in 12.5%
  - Flap removal in 14.6%

Results (3): Infection management

Medical management	Total population n=48	Favorable outcome n=24	Treatment failure n=24	*p*-value
ID-specialist referral	44 (91.7%)	23 (95.8%)	21 (87.5%)	0.609
Appropriate postoperative EAT	33 (68.8%)	17 (68.8%)	16 (66.7%)	1.000
Total duration of antimicrobial therapy (days)	93 (64.0-127.5)	93 (84.0-127.5)	88.5 (67.8-123.3)	0.773
Switch for oral administration only	16/43 (37.2%)	7/21 (40.9%)	9/22 (40.9%)	0.755

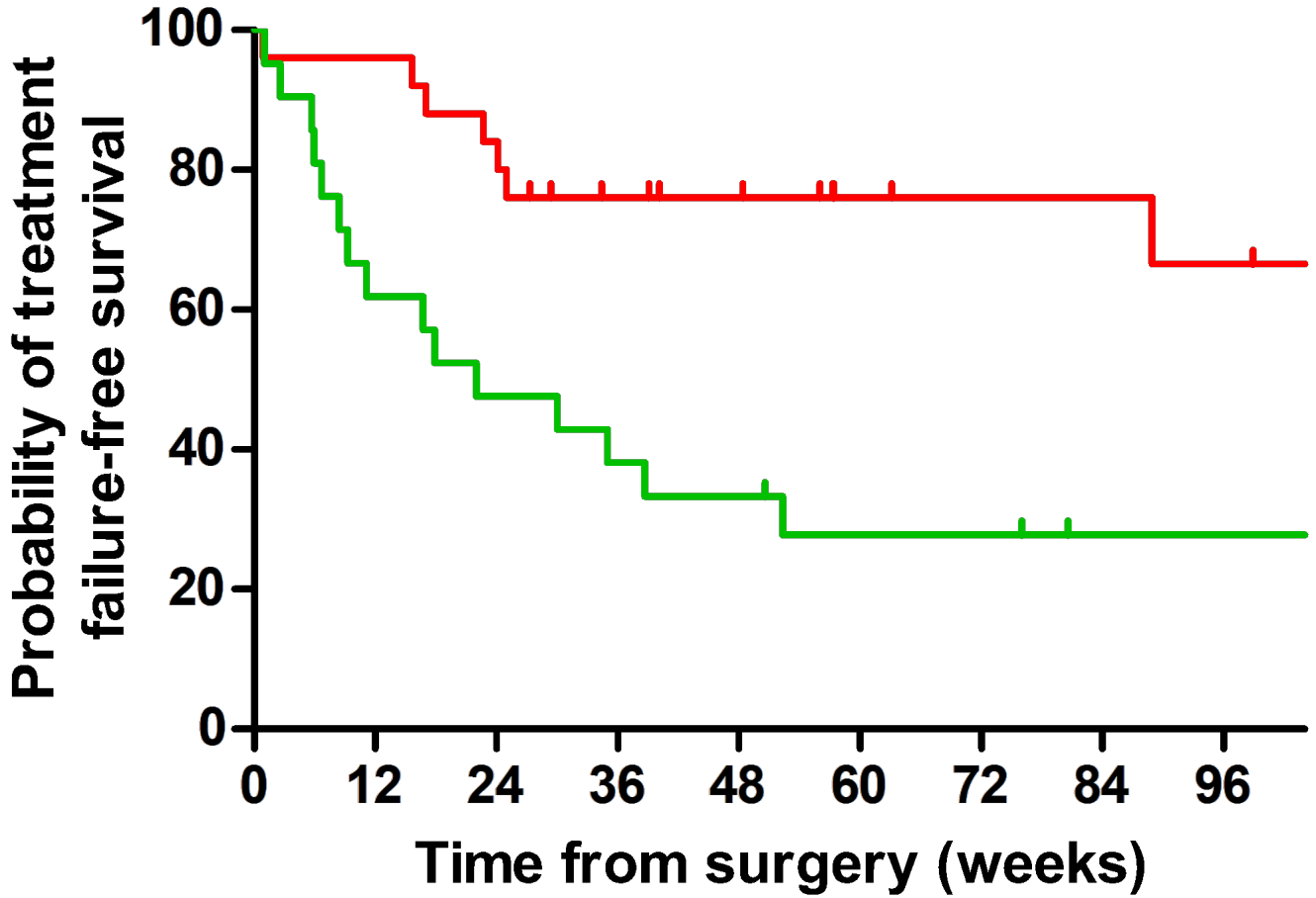
EAT: broad spectrum beta-lactam with NF-GNB coverage + glycopeptide or lipopeptide in 47.9%

Table 3 infection management

Results (4): Outcome

- **Follow-up 18 months**
- **Treatment failure in 50%**
  - Symptoms persistence 33.3%
  - Relapse 10.4%
  - Infection-related additional surgical procedure 42.6%
  - Flap removal 8.3%
  - Death 6.3%

Results (4): Outcome



ID referral < 1 week
ID referral > 1 week

Log rank (Mantel-Cox) test; p=0.0025

< 1 week:
OR 0.17 (0.05-0.58)

< 2 weeks:
OR 0.24 (0.06-0.93)

Fig.2 Kaplan Meier curve showing the probability of failure-free survival according to early ID referral > and < 1 week

Results (4): Outcome

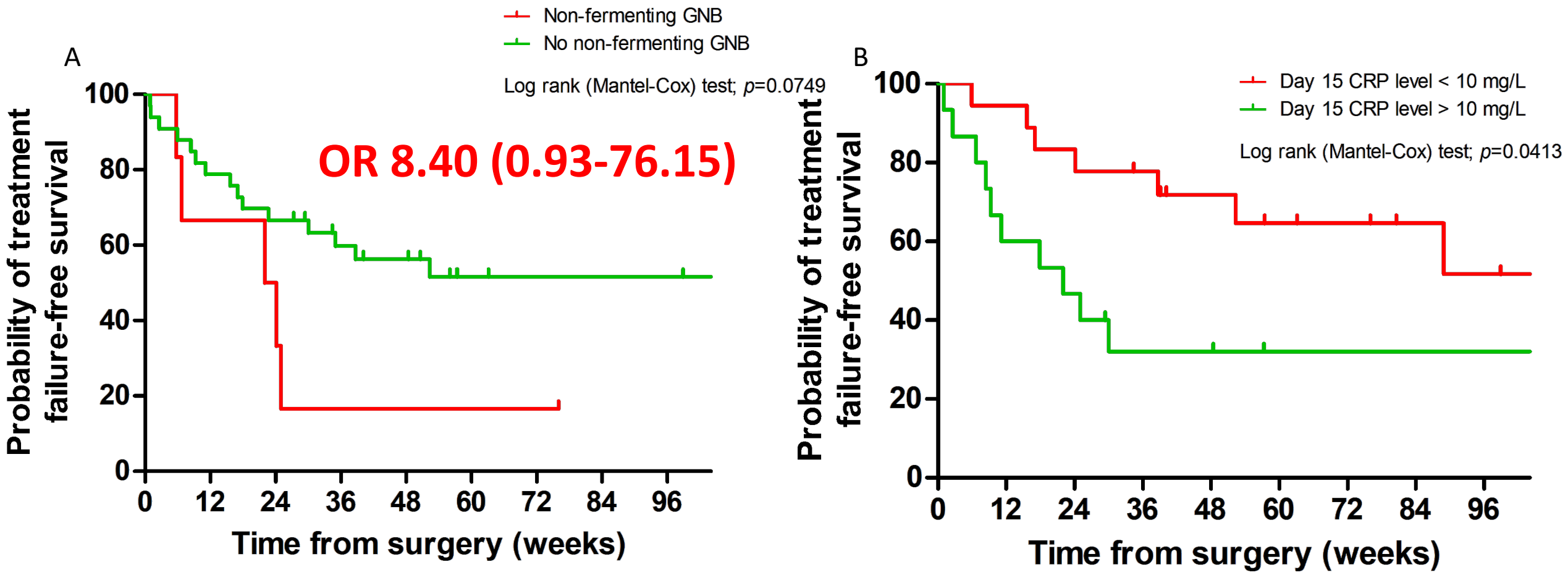


Fig.1 Kaplan Meier curve showing the probability of failure-free survival according to day 15 CRP level > 10 mg/L and < 10 mg/L (A) and non-fermenting infection (B).

Conclusion (1)

- **Limits**
  - Retrospective cohort study
  - Heterogeneous series
  - Small sample size
- **But**
  - First large cohort
  - Rare disease

Conclusion (2)

- **High treatment failure risk**
- **Clinical and radiological features similar to prosthetic BJI**[8]
- **Polymicrobial documentation and impact on empirical antimicrobial therapy**[9-10]
  - Interpretation ?
  - Non-fermenting GNB
  - *Enterococcus* spp
  - Fungal ?

EMPIRICAL ANTIMICROBIAL THERAPY PROPOSAL:

BROAD-SPECTRUM BETALACTAM
+
GLYCO/LIPOPEPTIDE

[8]Zimmerli et al. N Engl J Med. 2004, [9]Park et al. Korean J Intern Med. 2016, [10]Durand et al. Laryngoscope 2015

Conclusion (3)

- **Early ID-specialist referral**
  - Locally multidisciplinary meetings[11]
  - Patient referral in specialized centers for the management of BJI

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[11]Ferry et al. Orthop Traumatol Surg Res. 2019

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