Is Edentulism Associated with Lower Bacteremia and Transplant-Associated Toxicities in Patients with Multiple Myeloma?

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Objective: Previous studies suggest that edentulous (subjects without teeth) have a lower inflammatory state than non-edentulous individuals probably due to periodontal infection in non-edentulous subjects. We hypothesized that edentulous patients would have a lower incidence of bacteremia and other complications associated with autotransplantation for multiple myeloma (MM).

Methods: We conducted a retrospective case-control study of patients who received autologous hematopoietic stem cell transplantation (AHCT) for multiple MM at the Audie L. Murphy Memorial Veterans Hospital Bone Marrow Transplant Unit, in San Antonio, Texas from January 2003 through September 2012. Case subjects were defined as edentulous and controls were defined as non-edentulous. The 2 groups were matched for age, gender, ethnicity, MM stage, time from diagnosis to transplant, performance status, and conditioning regimen. The following posttransplant toxicities were analyzed: bacteremia, oral mucositis, nausea/vomiting, diarrhea, neutrophil engraftment and length of hospital stay.

Results: During the study period, 297 AHCT were performed at our institution. Of these, 45 (15%) patients were found to be edentulous at the time of first AHCT. Forty-five case subjects were matched to 90 controls. All patients were males, their median age was 60 years (range, 42-75), their Karnofsky performance status score mean was 90 (range, 70-90), and all received melphalan as part of the conditioning regimen. The majority of patients, 90 (67%) had stage III MM at transplantation and the median time from diagnosis to transplantation was 12 months (range, 4-103).

The incidence and severity of all posttransplant toxicities analyzed were similar in both groups (see Table 1). Thirty-eight (84%) of edentulous patients were smokers or had a history of smoking at the time of AHCT compared to 58 (64%) of the control group (P = .016). Overall survival after transplant was similar in both groups.

Conclusions: The incidence of toxicities after AHCT experienced by edentulous MM patients was similar to controls including bacteremia and oral mucositis. There was a strong association between edentulism and smoking.

Table 1

<table>
<thead>
<tr>
<th>Post-AHCT patient toxicities</th>
<th>Edentulous N=45</th>
<th>Control Group N=90</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bacteremia, n (%)</td>
<td>Yes 11 (24)</td>
<td>18 (20)</td>
<td>0.553</td>
</tr>
<tr>
<td></td>
<td>No 34 (76)</td>
<td>72 (80)</td>
<td></td>
</tr>
<tr>
<td>Oral mucositis, n (%)</td>
<td>Grade 0 13 (29)</td>
<td>33 (37)</td>
<td>0.465</td>
</tr>
<tr>
<td></td>
<td>Grade 1 16 (36)</td>
<td>21 (23)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Grade 2 13 (29)</td>
<td>27 (30)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Grade 3 3 (7)</td>
<td>9 (10)</td>
<td></td>
</tr>
<tr>
<td>Nausea/Vomiting, n (%)</td>
<td>Grade 0 4 (9)</td>
<td>7 (8)</td>
<td>0.744</td>
</tr>
<tr>
<td></td>
<td>Grade 1 24 (53)</td>
<td>40 (44)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Grade 2 14 (31)</td>
<td>36 (40)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Grade 3 3 (7)</td>
<td>7 (8)</td>
<td></td>
</tr>
<tr>
<td>Diarrhea, n (%)</td>
<td>Grade 0 6 (13)</td>
<td>10 (11)</td>
<td>0.095</td>
</tr>
<tr>
<td></td>
<td>Grade 1 7 (16)</td>
<td>17 (19)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Grade 2 15 (33)</td>
<td>24 (27)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Grade 3 14 (31)</td>
<td>39 (43)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Grade 4 3 (7)</td>
<td>0 (0)</td>
<td></td>
</tr>
<tr>
<td>Days to ANC engraftment</td>
<td>Mean (SD) 10.84 (1.80)</td>
<td>10.83 (1.16)</td>
<td>0.966</td>
</tr>
<tr>
<td></td>
<td>Range 8-31</td>
<td>9-17</td>
<td></td>
</tr>
<tr>
<td>Length of hospital stay</td>
<td>Mean (SD) 15.76 (4.94)</td>
<td>17.47 (5.99)</td>
<td>0.098</td>
</tr>
<tr>
<td></td>
<td>Range 3-30</td>
<td>3-52</td>
<td></td>
</tr>
</tbody>
</table>
surveillance cultures ($P < .0001$). When MMCI cases were
compared to single MCI cases, significant differences
included: female gender ($P < .0349$), receipt of allo-HSCT ($P <
.0373$), vancomycin ($P < .0012$) and cefepime ($P < .0009$) use.
There was no difference in the number of patients who
experienced neutropenic fever between MMCI, MCI ($P <
.275$) or culture negative cases ($P < .1247$). Strept mitis or
C.dififice infection occurred concomitantly or preceded the
second MCI in 29(47%) cases. Overall mortality was signi-
cantly higher in MMCI cases when compared to cases
without any positive cultures ($P < .001$) or patients with
a single MCI ($P < .0197$). There was no difference in overall
mortality for patients who developed MMCI $<72$hours
(polymicrobial) versus MMCI-$>72$ (non-polymicrobial; $P <
.2990$).

MMCI are an infrequent but serious cause of adverse events
which occur during HSCT. Patients who are at high risk for
developing MMCI require increased vigilance and early
aggressive antibiotic therapy.

### POSTER SESSION 1: TRANSPLANT DATA MANAGEMENT

#### 324

Reduce Errors and Past Due Reports Via Monthly Audits
Using Crid Numbers
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**Background:** In 2004, the National Marrow Donor Pro-
gram's database merged with the International Bone
Marrow Transplant Registry to streamline transplant
research. To manage the fusion of forms generated in two
separate databases, the Center for International Blood and
Marrow Transplant Research (CIBMTR) began assigning
each patient a unique Recipient Identification Number
(CRID) in 2007. This has allowed transplant outcomes to be
reported annually, because forms are now automatically
generated for each CRID. Our center created a secure CRID
spreadsheet to manage the merge and track form due dates
(Figure 1). The spreadsheet has evolved into an auditing
tool, serving to simplify our form assignment process and
improve quality.

**Best Practices:** Using Forms Net, a designated Protocol
Coordinator (PC) generates a monthly list of forms due for
the next five week reporting period. Next, the list is exported
to an excel spreadsheet allowing the PC to assign forms to
Data Coordinators (DC's) with a DC due date set two weeks
prior to the final due date in FormsNet. After the forms are
assigned, DC's use the CRID spreadsheet to cross reference
CRID numbers with Medical Record Numbers (MRN) to
identify the corresponding patient to complete forms. The PC
reviews each form using the CRID spreadsheet to track any
errors made by the DC completing the form. Next, the
audited forms are returned to the DC who corrects and
reprocess the form in FormsNet. Each quarter, a designated
DC cross references the CRID spreadsheet with Forms Net to
ensure error correction and data quality. The spreadsheet can
also be used as an opportunity to re-educate DC's on
frequently missed fields and reduce errors on the following
month's forms.

**Outcomes:** In the 2008 CIBMTR audit, our center's critical
field error rate was 4.2%. Subsequently, implementation of
the secure CRID spreadsheet helped reduce our 2012 critical
field error rate to 1.7%. This tool will continue increasing
data quality and reporting outcomes while concomitantly
helping us reach our department goal of <1% error rate in
2016.

**Figure 1.**

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Timely Capture of Relevant Data for CIBMTR
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**Introduction:** Each hematopoietic stem cell transplant
(HSCT) performed and fully reported to CIBMTR generates
key information to support research that has cumulatively
led to increased survival and enriched quality of life of
thousands of patients. Between 50 and 60 HSCT (autologous,
related and unrelated) are now annually performed
at the Pediatric Oncology Institute, São Paulo, Brazil. The
program started in 1999 and the first 167 transplants
were reported by physicians and by the Cell Processing
Laboratory staff. However, over the past 4 years, the
institution was unable to keep up with the reporting
schedule due to increasing working load. In February
2012, the effort to report all new and old patients to
CIBMTR was resumed.

**Objective:** To report and share the strategy used to have all
629 forms efficiently updated and reported within 8
months.

**Methods:** The institutional efforts started by hiring a
trained CRA part time devoted to CIBMTR data manage-
ment. A very useful and comprehensive Excel-based
spreadsheet was developed to have visual display of all due
dates with colorful flags and automatic updates to the
current date. Work flows were developed to capture data
during weekly medical rounds. All sources of medical
information – charts, laboratory and radiological reports,
medical round reports - were accessed whenever necessary
and included in the patient charts as documented source of
information. All forms were weekly reviewed with a senior
physician to ensure appropriate training and education of
the new CRA.

**Results:** A total of 360 patients underwent HSCT between
1999 and September 2012. The CIBMTR forms had been
last updated in 2008 and no new patients were registered
since then. All information that posed the greatest