**TITLE**

**Clinical characteristics, treatment intent and outcome in a consecutive 10-year cohort of oral cancer patients aged 75 years and older.**

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The paper has not been submitted to another journal or presented at any meeting. The study was approved by the Clinical Audit Department at Aintree University Hospital. There is no conflict of interest to declare.

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**ABSTRACT (250 words)**

Prevalence of oral squamous cell carcinoma (OSCC) in the elderly is expected to increase by nearly a third in the next decade. Management of OSCC in older patients is potentially more challenging due to their pre-existing medical co-morbidities, frailty, reduced life expectancy and social issues. The aim of this retrospective review is to report on the treatment provided to patients of 75 years and over, case mix and survival. All patients aged 75 years and over who were diagnosed with OSCC in Merseyside between 1st January 2007 and 31st December 2016 treated with either curative or palliative intent were included. Their hospital notes were reviewed. Fishers’ Exact test and Kaplan-Meier analysis were used for data analysis. There were 236 patients with a median age of 81 years. 67% were treated curatively and 33% palliatively. Factors associated with palliation include older age, advanced tumour staging, cognitive impairment and residence in a nursing or residential home. Of 165 patients offered curative treatment 4% (6) declined due to personal or family reasons. Overall survival for palliative patients was 12% at 1 year and 7% at 2 years, whereas for patients treated curatively it was 74% at 1 year, 56% at 2 years and 34% at 5 years. Patients over 85 years of age were less likely to have composite free flaps and post-operative radiotherapy. Peri-operative mortality was 2.6%. Improvements in surgical techniques and peri-operative management, enable clinicians to offer curative intent to older frail patients. With careful case selection outcomes can be very good.

**KEYWORDS**

Oral cancer; Elderly; curative; palliative; survival

**INTRODUCTION**

The management of oral squamous cell carcinoma (OSCC) in the elderly is challenging due to their potential frailty and lower life expectancy. As the population gets older, the prevalence of head and neck cancer in the people aged 65 and above in the Western world will increased by 27% from 2020 to 2030.(1) There is no clear definition of the elderly in medical literature. The US National Institute of Aging classified the ‘’elderly’’ into three groups: ‘’young old’’ (65-74years), ‘’older old’’ (74-84years) and ‘’oldest old’’ (>85 years).(2) Chronological age by itself has little bearing on the treatment decisions. Consideration is given to the biological age, performance status and existing co-morbidities to provide optimal treatment. In this study, focus is given to the ’older old’’ and ‘’oldest old’’ as these ages can pose a dilemma as to treatment with curative or palliative intent.

Literature would suggest that with careful selection, chronological age has no effect on the treatment outcomes for elderly patients who underwent tumour resection with flap reconstruction.(3-5) Studies have showed no difference in the treatment outcomes with radiotherapy between the elderly and their younger counterparts.(6-8) In general, a cut off age for chemotherapy is 70 years due to risks of renal toxicity.(9) Reduction in dose of chemotherapy decreases its efficacy and there is no clear survival benefit.(9-11) Palliative care is often advocated for patients with poor performance status and severe co-morbidities as their survival is relatively short and complications associated with the disease or curative treatment may deteriorate their quality of life.(12) Derks et al. emphasised that treatment choice should not be dependent on chronological age but based on the medical assessment and patients’ wishes.(13)

Several papers reported that the health-related quality of life (HRQoL) in elderly patients was comparable or better than the younger patients following surgery.(14, 15) Laraway et al. emphasised the importance of minimising the treatment burden for patients over 75 years of age and treatment should be planned based on the individual.(15)

The primary aim of this retrospective study was to report on the treatment intent provided to a consecutive cohort of patients aged 75 years and over with OSCC, their recurrence-free survival and overall survival. There is a paucity of studies that directly compare outcomes with respect to intention to treat and this comparison is useful for clinicians when discussing treatment decisions with patients and their carers.

**METHODS**

This population comprised of all patients aged 75 years and over at diagnosis who were diagnosed and treated at Aintree University Hospital with OSCC between 1st January 2007 and 31st December 2016. Patients treated with curative and palliative intent were included. We extracted data from electronic case notes on SIGMA (System C), outpatient clinical letters and multidisciplinary forms. Our data parameters included patient demographics, ASA grading, dementia, history of smoking and alcohol use, OSCC staging (AJCC 7) and site of lesion, type of treatment intent (curative or palliative), date of last follow-up and date of death. For patients receiving curative treatment, we recorded treatment modality, use of reconstructive flaps (local or bony/osseous or soft tissue free flaps), length of hospital stays and post-operative complications using the Clavien-Dindo classification.(16) Surgical margins were recorded.

Statistical methods

Fishers exact test was used to compare groups regarding categorical data, and either the Mann-Whitney test (2 comparison groups) or Kruskal-Wallis test (3 groups) was used to compare groups regarding numerical data. Kaplan-Meier methods were used to estimate survival curves and overall survival rates at 1, 2 and 5 years. The log-rank test was used to compare the survival curves. SPSS v25 was used for the analysis and statistical significance was at the 5% level. This study was approved by Aintree University Hospital Audit Department and used data as collected in routine care.

**RESULTS**

There were 236 patients diagnosed with OSCC between 2007 and 2016, with median (IQR) age at diagnosis of 81 (78-86) years and 49% (115) were female. Tumour locations were anterior two-thirds of tongue for 41% (96), buccal mucosa for 20% (48), floor of mouth for 16% (37), lower gingiva for 14% (32) and elsewhere in the oral cavity for 10% (23). Half (52%, 123/235) of the cancers were in the advanced overall clinical stage 3-4. For two-thirds of the cohort (67% (159)), the treatment intent was curative and overall 41% (96) were treated by surgery alone, 25% (58) by surgery with adjuvant radiotherapy, 2% (5) by either radiotherapy or chemo-radiotherapy alone without surgery, whilst 33% (77) were treated palliatively. For the 154 patients who had surgery, 45% (70) had free-flap transfer of which 24 were osseous/bone flaps and 46 were soft tissue only flaps. Unplanned return to theatre was necessary for 17% (12/70) of the free-flaps and of these there were three flap salvages two of which failed and there was one other flap failure. Patients remained in hospital after surgery for a median (IQR) of 8 (1-18) days, n=148. In the surgical patients, 35% (48/139) had a tracheostomy, and 53% (80/151) had a neck dissection of which 12 were bilateral and 68 unilateral; 34% (51/152) had a bone resection. Margins were clear for 26% (38/149), close for 58% (86/149) and involved for 17% (25/149) and unknown for 5 patients. The Clavien-Dindo classification for grading adverse events (i.e. complications) indicated grade I or higher for 31% (49/156) of which 10 were Grade I (any deviation from the normal post-operative course not requiring surgical, endoscopic or radiological intervention), 15 were Grade II (complications requiring drug treatments other than those allowed for Grade I complications; this includes blood transfusion and total parenteral nutrition (TPN)), 19 were Grade III (complications requiring surgical, endoscopic or radiological intervention) and 5 were Grade V (death of the patient). Other patient characteristics are included in Table 1.

Patient case-mix within three age groups (75-79, 80-84 and ≥85 years) is shown in Table 1. Across these three age groups, older patients were less likely to be male, married or treated curatively. Also, older patients (over 85 years) receiving curative treatment were less likely to receive adjuvant post-operative radiotherapy, osseous/bone free-flap transfer or a tracheostomy. There was no clear difference in survival curves of the three age groups in terms of local recurrence-free (Figure 1) or local or regional recurrence-free survival (Figure 2).

Case-mix factors associated with palliative care are shown in Table 2. Older age, more advanced tumour staging, an indication of dementia and residing in either a family home or a nursing/residential home (as opposed a patient’s own home) were associated with palliation. Of 165 patients offered curative treatment, 4% (6) declined due to personal or family reasons; their ages were 75, 79, 80,82, 86 and 95 years. Overall survival for palliation patients was 12% (SE 4%) at one year, 7% (SE 3%) at two years and zero at 5 years. In comparison, survival for patients treated curatively was 74% (SE 4%) at one year, 56% (SE 4%) at two years and 34% (SE 4%) at 5 years, Log-rank test p<0.001. There was no notable difference in survival between the three age groups for patients who were treated curatively (Figure 3). One-month peri-operative mortality was 2.6% (4/154), with little difference by age group (2.6%, 2/77; 2.1%, 1/47; 3.3% 1/30).

**DISCUSSION**

With an increasing elderly population, there will be a large proportion of elderly patients presenting with OSCC. Our study comprised a consecutive group, incorporating both curative and palliative patients. There is a distinct paucity of studies that directly compare outcomes of oral cancer with respect to intention to treat. It is a comprehensive sample over a 10-year period as all cases of OSCC in the region would have been treated at the Unit. The limitations of presenting cohort data are acknowledged but there is an absence of randomised trial evidence. Accepting the primacy of curative intent were feasible, the inclusion of a consecutive series allows for the opportunity to reflect on selection criteria, and this aspect is weak in other papers. When offering such radical treatment to the older patients, those less familiar with the speciality can be helped in the justification by considering the outcomes for those treated palliatively. Their demise is short compared to those curative where the survival without cancer is relatively good given their age. The data could serve to give ‘hope’ to the older patients and their families when facing major surgery for oral cancer and confirm the sense of purpose for the surgical team and nursing staff. Although the salient case-mix factors have been included, the data is limited due to the retrospective nature of case note review, with some clinical data being incomplete. Post-operative complications may have been under-estimated. It was not possible to include a frailty score, such as the standardised Edmonton frailty scale, (17) as it should be completed contemporaneously.

In terms of treatment with curative intent, it is recognised that elderly patients can tolerate major surgery including free-flap reconstructions. In a retrospective evaluation on 17 patients aged from 80 to 92 years, Sugiura et al. reported a 100% success rate for free fibula flap transfer and showed no difference in post-operative complications between these elderly and younger (under 80 years) groups.(3) In our study, unplanned return to theatre following free tissue transfer was 17%, and flap success rate was 96%. When selecting patients for major surgery there needs to be physiological capacity for patients to tolerate further surgical procedures accepting that with low rates of flap failure, a second major operation occurs infrequently. In the 80 and over, those having composite flaps were more likely to have a composite radial, with no patients having a DCIA or scapula and only two having fibulas. In terms of the choice of fibula or radial the premise advocated by the anaesthetic team is for as short an operation as feasible so flaps that allow simultaneous flap harvest are a preferred option. There is an increased risk of peripheral vascular disease in the elderly and all patients have pre-operative lower limb angiography with a proportion having unsuitable vascular perfusion which precludes safe harvest of the peroneal system. Although there is limited bone stock when opting for the radial, the presence of bone prevents the reconstruction plate perforating through the tissues. The radial donor sites are plated, and the fracture rate is about 5% based on our ongoing local audit. In our cohort there were very few pedicle flaps or local flaps and this might be unusual compared to other centres. There were three submental island flaps, three buccal fat pad advancements and one buccal mucosa rotation. In terms of the reconstructive ladder the options tend to be either primary closure or laser allowing healing by secondary intention or free tissue transfer. In the older elderly patients (over 85 years) were less likely to receive composite free-flaps and post-operative radiotherapy but the rationale for this is unclear and probably it was aimed at reducing treatment burden. Resection margin is a very important prognostic factor and 17% had involved margins in the curative group. There was a mix of site, stage, and reconstruction with no clear trends at all. The margins seemed to reflect the aggressiveness of the cancer behaviour. It is impossible to speculate that the involved margin rate would have been lower if a resection was performed with an expectation of reconstruction with free tissue transfer. Of note, even with involved margins there were only nine failures (four local, four regional and one loco-regional).

In terms of patients’ decision making and priorities, both cure and survival are paramount and with increasing age there is evidence that although cure remains the top priority survival time becomes less important.(18) Not surprisingly, our data shows a clear difference in survival between curative and palliative patients. Where feasible, even in the older patient, it is appropriate to advocate curative intent. In this study, chronological age is a factor as palliative intent occurred in less than one in five of the under 80-year olds and half of the 85 years and older. More than half of the curative patients survived beyond two years and one third beyond five years, which is very encouraging given their age and clinical characteristics. However, it is important to be mindful of the potential treatment burden in respect of radical surgery and post-operative radiotherapy. Patients and their family will tend to want to cherish their final years and to optimise overall QoL, so a careful balance has to be considered.

Post-operative delirium (POD) can be a problem in the older patient due to prolonged length of anaesthesia. Several studies have identified that increasing age is a significant factor in the incidence of POD following surgery.(19-21) In our unit, the anaesthetists opt to use Bispectral index monitor to measure the depth of anaesthesia to avoid the use of opiates leading to better recovery and reduce risk of post-operative delirium.(22) Instead of opiates, they use IV lignocaine and magnesium to manage pain.

Further research is required to look at the influence of the frailty index and resilience score on the decision-making process for management of OSCC in elderly patients. Resilience has a role in patients’ QoL. Clinicians can utilise the resilience score to gauge patients’ QoL following treatment and to provide additional support to improve patients’ overall outcomes.(23) There is a role for geriatric medicine to be part of the multi-disciplinary meeting to provide their insight and possibly joint care of surgical patients to improve patient care. Although their survival outcome might just be a few years, their surgery will have extended their lives potentially without any significant detrimental impact of QoL.(15) Most patients accepted curative treatment when offered, with only a small proportion preferring best supportive care.

**CONCLUSION**

Improvements in surgical techniques and peri-operative management, enable clinicians to offer curative intent to older frail patients. With careful case selection outcomes can be very good. Clear assessment guidelines and protocols will assist in providing optimal care for an ever-increasing elderly population.

**ETHICS STATEMENT**

The study was approved by the Clinical Audit Department at Aintree University Hospital.

**CONFLICT OF INTEREST**

We have no conflicts of interest.

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**Table 1. Case mix and outcome for 236 patients with OSCC, stratified by age group**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | Age 75-79 years(n=101) | Age 80-84 years (N=68) | Age ≥85 years (n=67) | P value | Total (n=236) |
| Gender | Male | 62% | 63 | 46% | 31 | 40% | 27 | 0.01 | 51% | 121 |
| Year | 2007-2011 | 42% | 42 | 50% | 34 | 46% | 31 | 0.56 | 45% | 107 |
|  | 2012-2016 | 58% | 59 | 50% | 34 | 54% | 36 | 55% | 129 |
| Tumour site | Buccal | 17% | 17 | 22% | 15 | 24% | 16 | 0.54 | 20% | 48 |
| Lower gum | 15% | 15 | 13% | 9 | 12% | 8 | 14% | 32 |
|  | Tongue (ant 2/3) | 37% | 37 | 49% | 33 | 39% | 26 | 41% | 96 |
|  | FOM | 20% | 20 | 9% | 6 | 16% | 11 | 16% | 37 |
|  | Other | 12% | 12 | 7% | 5 | 9% | 6 | 10% | 23 |
| Clinical stage  | Early (1-2 stage) | 43% | 43 | 54% | 37 | 48% | 32 | 0.33 exc NK | 47% | 112 |
| Late (3-4 stage) | 57% | 58 | 46% | 31 | 51% | 34 | 52% | 123 |
|  | Not known |  | - |  |  |  | 1 |  | 0.4% | 1 |
| Pathologystage | If known: |  |  |  |  |  |  |  |  |  |
| Early (1-2 stage) | 50% | 40 | 53% | 28 | 67% | 24 | 0.26 exc NK | 54% | 92 |
| Late (3-4 stage) | 50% | 40 | 47% | 25 | 33% | 12 | 46% | 77 |
|  |  |  |  |  |  |  |  |  |  |  |
|  | Not known | 21% | 21 | 22% | 15 | 46% | 31 |  | 28% | 67 |
| Primary treatment(intended) | Curative | 82% | 83 | 72% | 49 | 49% | 33 | <0.001 | 70% | 165 |
| Palliation | 18% | 18 | 28% | 19 | 51% | 34 | 30% | 71 |
| Primary treatment(actual) | Curative | 80% | 81 | 69% | 47 | 46% | 31 | <0.001 | 67% | 159 |
| Palliation | 20% | 20 | 31% | 21 | 54% | 36 | 33% | 77 |
| If curative: |  |  |  |  |  |  |  |  |  |
| Surgery only | 52% | 42 | 60% | 28 | 84% | 26 | 0.007 | 60% | 96 |
|  | Surgery & adv RT | 43% | 35 | 40% | 19 | 13% | 4 | 36% | 58 |
|  | RT or CRT only | 5% | 4 |  | - | 3% | 1 | 3% | 5 |
| Free-Flap | Soft tissue only | 35% | 27 | 26% | 12 | 23% | 7 | 0.05  | 30% | 46 |
| (surgery) | Osseous/Bone | 21% | 16 | 15% | 7 | 3% | 1 | 16% | 24 |
|  | No flap | 44% | 34 | 60% | 28 | 73% | 22 | 55% | 84 |
| LOS (days) after surgery | Median (IQR) | 8 (2-21), n=74 | 9 (1-18), N=46 | 5 (1-15), n=28 | 0.62 | 8 (1-18), n=148 |
| Clearance margins(surgery) | If known: |  |  |  |  |  |  |  |  |  |
| Clear | 24% | 18 | 30% | 13 | 24% | 7 | 0.93 exc NK | 26% | 38 |
| Close | 61% | 46 | 52% | 23 | 59% | 17 | 58% | 86 |
| Involved | 16% | 12 | 18% | 8 | 17% | 5 | 17% | 25 |
|  |  |  |  |  |  |  |  |  |  |  |
|  | Not known | 1% | 1 | 6% | 3 | 3% | 1 |  | 3% | 5 |
| Tracheostomy(surgery) | If Known: |  |  |  |  |  |  |  |  |  |
| Yes | 44% | 31 | 36% | 15 | 8% | 2 | 0.002 exc NK | 35% | 48 |
| No | 56% | 40 | 64% | 27 | 92% | 24 | 65% | 91 |
|  |  |  |  |  |  |  |  |  |  |  |
|  | Not known | 8% | 6 | 11% | 5 | 13% | 4 |  | 10% | 15 |
| Neck dissection(surgery) | Bilateral | 12% | 9 | 4% | 2 | 3% | 1 | 0.58 exc NK | 8% | 12 |
| Unilateral | 44% | 34 | 43% | 20 | 47% | 14 | 44% | 68 |
|  | None | 43% | 33 | 49% | 23 | 50% | 15 | 46% | 71 |
|  | Not known | 1% | 1 | 4% | 2 |  | - |  | 2% | 3 |
| Bone resection(surgery) | Rim resection | 14% | 11 | 4% | 2 | 7% | 2 | 0.09 exc NK | 10% | 15 |
| Mandibular segment | 19% | 15 | 19% | 9 | 3% | 1 | 16% | 25 |
| Maxillectomy | 9% | 7 | 4% | 2 | 7% | 2 | 7% | 11 |
|  | None | 56% | 43 | 72% | 34 | 80% | 24 | 66% | 101 |
|  | Not known | 1% | 1 | - | - | 3% | 1 |  | 1% | 2 |
| Clavien-Dindo | 0 | 67% | 54 | 68% | 32 | 68% | 21 | 0.75 exc NK | 67% | 107 |
| Classification | I | 6% | 5 | 6% | 3 | 6% | 2 | 6% | 10 |
| (curative) | II | 12% | 10 | 9% | 4 | 3% | 1 | 9% | 15 |
|  | III | 9% | 7 | 13% | 6 | 19% | 6 | 12% | 19 |
|  | IV |  | - |  | - |  | - |  | - |
|  | V | 4% | 3 | 4% | 2 |  | 0 | 3% | 5 |
|  | Not Known | 2% | 2 |  | - | 3% | 1 |  | 2% | 3 |
| ASA | 1 | 2% | 2 |  | - |  | - | 0.67 exc NK | 1% | 2 |
|  | 2 | 47% | 47 | 40% | 27 | 31% | 21 | 40% | 95 |
|  | 3 | 45% | 45 | 54% | 37 | 46% | 31 | 48% | 113 |
|  | 4 | 7% | 7 | 4% | 3 | 6% | 4 | 6% | 14 |
|  | Not known |  | - | 1% | 1 | 16% | 11 |  | 5% | 12 |
| Dementia  | Any mention of | 7% | 7 | 9% | 6 | 9% | 6 | 0.87 | 8% | 19 |
| Smoking status | If known: |  |  |  |  |  |  |  |  |  |
|  | Current | 32% | 29 | 19% | 9 | 15% | 6 | 0.10 | 25% | 44 |
|  | Ex | 39% | 35 | 48% | 23 | 36% | 14 | 41% | 72 |
|  | Never | 29% | 26 | 33% | 16 | 40% | 19 | 34% | 61 |
|  |  |  |  |  |  |  |  |  |  |  |
|  | Known | 89% | 90 | 71% | 48 | 58% | 39 | <0.001 | 75% | 177 |
|  | Not known | 11% | 11 | 29% | 20 | 42% | 28 | 25% | 59 |
| Alcohol status | If known: |  |  |  |  |  |  |  |  |  |
|  | Nil | 39% | 32 | 42% | 19 | 56% | 18 | 0.32 | 43% | 69 |
|  | Occasional, <5 | 23% | 19 | 29% | 13 | 13% | 4 | 23% | 36 |
|  | 5 or more units | 39% | 32 | 29% | 13 | 31% | 10 | 34% | 55 |
|  |  |  |  |  |  |  |  |  |  |  |
|  | Known | 82% | 83 | 66% | 45 | 48% | 32 | <0.001 | 68% | 160 |
|  | Not known | 18% | 18 | 34% | 23 | 52% | 35 | 32% | 76 |
| Marital status | If known: |  |  |  |  |  |  |  |  |  |
| Single | 8% | 8 | 15% | 10 | 18% | 10 | 0.004 exc NK | 13% | 28 |
|  | Married | 55% | 53 | 35% | 23 | 29% | 16 | 42% | 92 |
|  | Divorced | 7% | 7 | 2% | 1 | 2% | 1 | 4% | 9 |
|  | Widowed | 30% | 29 | 48% | 31 | 52% | 29 | 41% | 89 |
|  |  |  |  |  |  |  |  |  |  |  |
|  | Not known | 4% | 4 | 4% | 3 | 16% | 11 |  | 8% | 18 |
| Residence | Own | 88% | 89 | 79% | 54 | 79% | 53 | 0.28 exc NK | 83% | 196 |
| (Initial) | Family | 4% | 4 | 9% | 6 | 6% | 4 | 6% | 14 |
|  | Nursing home | 7% | 7 | 10% | 7 | 15% | 10 | 10% | 24 |
|  | Residential home |  | - | 1% | 1 |  | - | 0.4% | 1 |
|  | Not known | 1% | 1 |  | - |  | - |  | 0.4% | 1 |
| Residence | Own | 80% | 81 | 78% | 53 | 72% | 48 | 0.58 exc NK | 77% | 182 |
| (Last known) | Family | 4% | 4 | 6% | 4 | 6% | 4 | 5% | 12 |
|  | Nursing home | 13% | 13 | 13% | 9 | 21% | 14 | 15% | 36 |
|  | Residential home |  | - | 1% | 1 |  | - | 0.4% | 1 |
|  | Hospice | 2% | 2 | 1% | 1 |  | - | 1% | 3 |
|  | Died in hospital |  | - |  | - | 1% | 1 | 0.4% | 1 |
|  | Not known | 1% | 1 |  | - |  | - |  | 0.4% | 1 |

Exc NK: the p value was computed after excluding the not known category

**Table 2. Case mix and palliation**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  |  | Palliation (intended) |  |
|  |  | Patients | % | N | P value |
|  | Total | 236 | 30% | 71 |  |
| Age | 75-79 | 101 | 18% | 18 |  |
|  | 80-84 | 68 | 28% | 19 | <0.001 |
|  | ≥85 | 67 | 51% | 34 |  |
| Gender | Female | 115 | 35% | 40 | 0.16 |
|  | Male | 121 | 26% | 31 |
| Year | 2007-2011 | 107 | 30% | 32 | 0.99 |
|  | 2012-2016 | 129 | 32% | 39 |
| Tumour site | Buccal | 48 | 35% | 17 |  |
| Lower gum | 32 | 34% | 11 |  |
|  | Tongue (ant 2/3) | 96 | 27% | 26 | 0.70 |
|  | FOM | 37 | 24% | 9 |  |
|  | Other | 23 | 35% | 8 |  |
| Clinical stage  | Early (1-2 stage) | 112 | 11% | 12 | <0.001 exc NK |
| Late (3-4 stage) | 123 | 48% | 59 |
|  | Not known | 1 |  |  |  |
| P stage | Early (1-2 stage) | 92 | 3% | 3 | <0.001 exc NK |
| Late (3-4 stage) | 77 | 25% | 19 |
| Not known | 67 | 73% | 49 |  |
| ASA | 1 | 2 | - | 0 | 0.18 exc NK |
|  | 2 | 95 | 23% | 22 |
|  | 3 | 113 | 27% | 31 |
|  | 4 | 14 | 50% | 7 |
|  | Not known | 12 | 92% | 11 |  |
| Dementia  | Any mention of | 19 | 84% | 16 | <0.001 |
|  | No mention of | 217 | 25% | 55 |
| Smoking status | Current | 44 | 30% | 13 | 0.27 exc NK |
| Ex | 72 | 22% | 16 |
|  | Never | 61 | 16% | 10 |
|  | Not known | 59 | 54% | 32 |  |
| Alcohol status | Nil | 69 | 23% | 16 | 0.18 exc NK |
| Occasional, <5 | 36 | 8% | 3 |
|  | 5 or more units | 55 | 20% | 11 |
|  | Not known | 76 | 54% | 41 |  |
| Marital status | Single | 28 | 32% | 9 | 0.49 exc NK |
|  | Married | 92 | 24% | 22 |
|  | Divorced | 9 | 44% | 4 |
|  | Widowed | 89 | 27% | 24 |
|  | Not known | 18 | 67% | 12 |  |
| Residence | Own | 196 | 24% | 47 | <0.001 exc NK |
| (Initial) | Family | 14 | 36% | 5 |
|  | Nursing/Residential | 25 | 76% | 19 |
|  | Not known | 1 | - | 0 |  |

Exc NK: the p value was computed after excluding the not known category

**Figure 1. Local recurrence free survival (from diagnosis) by age group**



 Log rank test chi-squared value = 0.54, 2 df, P=0.76, N=228

**Figure 2. Local or regional recurrence free survival (from diagnosis) by age group**



 Log rank test chi-squared value = 0.63, 2 df, P=0.73, N=228

**Figure 3. Overall survival (from diagnosis) by age group (curative) and treatment intent, N=236 patients**



The three age groups are for curative patients only.

Comparing the three age groups for curatively treated patients: Log rank test chi-squared value = 0.58, 2 df, P=0.75, N=158