The Role of Radiation in the Treatment of Anal Sac Gland Adenocarcinomas

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Anal sac gland adenocarcinomas (ASGACA) are locally invasive and aggressive tumors that also have a high risk of metastasis to local nodes. These tumors also will spread to liver, spleen, lungs and sublumbar spine, but they often can take a long time to do so. Therefore it is important when treating these patients to be able to effectively control the locoregional disease – the primary tumor and local lymph nodes.

**Imaging**

Before discussing treatment it is important to know exactly what we are treating. This is why staging is an important part of the work up for all dogs with ASGACA. Abdominal ultrasound is a key part of staging as it allows visualization of the sublumbar nodes, liver and spleen to identify potential metastases in these organs. However, computed tomography (CT) also can provide important information. Lymph nodes in the pelvic canal often can not be identified using ultrasound because they are obscured by the overlying pelvic bones and occasionally gas in the colon.

However, another very important use of CT for ASGACA is for radiation planning. Most radiation therapy treatments done today are done using a three-dimensional treatment planning computer. Patients are immobilized in a positioning device, which will be used for each radiation therapy treatment. This assures that the patient is in the same position every day for radiation. Vacuum positioning devices have been shown to limit motion of the patient to less than 1 cm. (Yoshikawa H, 2012) In some cases, even when imaging has already been done with either a CT scan or ultrasound, (Turek M M, 2003) a second imaging study with CT is indicated for planning purposes because the previous imaging cannot be used for radiation planning.
**Radiation Therapy**

Radiation has shown to be beneficial for ASGACA both as an adjuvant treatment following surgery or alone. Definitive radiation involves between 16 and 20 treatments, delivered daily (usually Monday – Friday). Definitive radiation therapy, in combination with surgery and chemotherapy has been shown to be effective. In one study (Turek M M, 2003) 15 dogs were treated with surgery, radiation and mitoxantrone chemotherapy. The median survival time was 956 days (more than 2 and ½ years) with 66% of dogs still alive at 2 years after starting post op treatment. Interestingly this study also looked at the event free survival, which was defined as the time until either death, metastasis or local recurrence. What it showed was that many of these dogs developed either lymph node metastases or distant metastases early on but lived for a long period of time after this progression. We frequently see this in our patients. Not only can dogs with lymph node metastases have a good prognosis overall, but if the disease progresses these patients may still have a long survival.

Another study which included 113 dogs with ASGACA (Williams LE, 2003) confirmed the excellent prognosis for many dogs. In this study overall survival was 544 days. However, for dogs who received surgery radiation and chemotherapy there was a median survival of 742 days (just over two years) with more than 1/3 of dogs still alive three years after the start of treatment. These studies highlight the fact that ASGACA is a very treatable disease in dogs.

**Side Effects**

So far we have talked about outcome in terms of survival or quantity of life after treatment. However, what is just as important for our patients and their owners is quality of life. So it is important for us when we treat these patients that we keep this in mind. When treating dogs with anal sac carcinomas with radiation I will always treat the primary surgical site, the sublumbar lymph node area, and also the area between these two in the dorsal pelvis. Metastasis to sublumbar nodes are the most common location. However, in a number of patients metastasis can occur dorsal to the colon in the pelvic canal. Side effects
of definitive radiation can be significant in dogs, especially when such a large area needs to be treated. Most definitive radiation protocols result in significant short term side effects including colitis, proctitis, urethritis and perianal dermatitis. These side effects resolve, usually within 1 to 2 weeks after treatment. Although this can have a significant effect on quality of life in the short term, these side effects can be managed with pain medications, anti-inflammatory medications and antibiotics.

However, late, permanent side effects of radiation are possible and when these occur they can be devastating. In one study (Turek M M, 2003) 53% of dogs developed clinical complications long term and in another study (Williams LE, 2003) 3 out of 27 dogs that received radiation developed anal stricture but 3 out of 15 dogs that received surgery, radiation and chemotherapy developed a stricture. This level of side effects is not acceptable for our patients and two different methods have been used to try to minimize these effects.

**Increased fractionation**

In 2002 a paper was published (Anderson, 2002) looking specifically at radiation side effects in a clinical setting in dogs. This was the first of its kind because prior to this most studies focused on tumor responses and control and long term side effects were only mentioned in the paper briefly. What this study showed was that when dogs have radiation to their pelvis severe side effects are common. Thirty-one percent of dogs had severe effects. However, it also showed that when a lower dose per treatment is used, these side effects are much less common. None of the dogs that received less than 3Gy per treatment had severe side effects. The idea that a lower dose per treatment results in fewer long term side effects is not a new one. Most human radiation protocols last six to seven weeks because of this. However, this was the first time it was shown in dogs at the doses that we use clinically.

**Decreased dose to normal tissues**

The other method that we can use to limit the potential side effects from radiation in the colon is to limit the dose of radiation delivered to the area. New radiation techniques are making this more possible than ever. Technological
advances such as the use of intensity modulated radiation therapy will allow us to cone our radiation dose around the areas that need to be treated while limiting the dose to the normal tissues, especially the colon. Not only would this help with late effects, but it also seems to be decreasing the intensity of short term side effects, allowing our patients to get through treatment with a much better quality of life.

**Bibliography**

