Minimally Invasive Surgery in Veterinary Practice: A 2010 Survey of Diplomates and Residents of the American College of Veterinary Surgeons

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Objective: To report the current state of minimally invasive surgery (MIS) in veterinary surgical practice in 2010.

Study Design: Electronic questionnaire.

Sample Population: Diplomates and residents of the American College of Veterinary Surgeons (ACVS).

Methods: A survey (38 questions for Diplomates, 23 questions for residents) was sent electronically to 1216 Diplomates and 300 residents. Questions were organized into 5 categories to investigate: (1) caseload and distribution of MIS cases; (2) MIS training; (3) MIS benefits, morbidity, limitations and motivating factors; (4) ACVS role; and (5) demographics of the study population.

Results: Eighty-six percent of small animal (SA) Diplomates, 99% of large animal (LA) Diplomates, and 98% of residents had performed MIS. Median LA caseload (30 cases/year; range, 1–600) was significantly higher than SA caseload (20 cases/year; range, 1–350). Descending order of case distribution was: arthroscopy > laparoscopy > endoscopic upper airway > thoracoscopy. Sixty percent of Diplomates and 98% of residents received MIS training during their residency. Residents’ perspective of MIS training proficiency was positively correlated to caseload. Ninety-five percent of all respondents felt postoperative morbidity was less with MIS, and were motivated by patient benefits, maintaining a high standard of care, and personal interests. Fifty-eight percent of Diplomates and 89% of residents felt ACVS should be involved in developing MIS training.

Conclusions: MIS is widely used by ACVS Diplomates and residents in clinical practice; however, important differences exist between SA and LA surgeons and practice types. MIS training in partnership with the ACVS is needed for continued development in veterinary surgery. Veterinary Surgery 42 (2013) 635–642
Methicillin - Resistant Staphylococcal Contamination of
Clothing Worn by Personnel in a Veterinary Teaching Hospital

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Objective: To determine the methicillin - resistant Staphylococcus aureus (MRSA) and methicillin - resistant Staphylococcus pseudintermedius (MRSP) contamination rate of white coats (WC) and surgical scrubs (SS) worn by personnel at the Ontario Veterinary College Health Sciences Centre (OVCHSC) and to identify risk factors associated with clothing contamination.

Study Design: Cross-sectional study.

Sample Population: Personnel including clinical faculty, house officers, technicians, and veterinary students working at the OVCHSC.

Methods: Electrostatic cloths were used to sample WC and SS of hospital personnel. Samples were tested for MRSA and MRSP and isolates were typed. Participants completed a self-administered questionnaire and data was evaluated for risk factors.

Results: Of 114 specimens, MRS were isolated from 20 (17.5%), MRSA from 4 (3.5%), and MRSP from 16 (14.0%). Technicians were 9.5 (OR 1.25, 95% CI: 1.2 - 1; P >0.03) more likely than students to have clothing contaminated with MRSA. No risk factors were identified for MRSP or for overall MRS contamination.

Conclusions: Standard hospital clothing was found to have a high prevalence of MRS contamination in a veterinary teaching hospital and could be a source of hospitalacquired infections. Veterinary Surgery 42 (2013) 643-648
Innovative Approach to Laparoscopic Adrenalectomy for Treatment of Unilateral Adrenal Gland Tumors in Dogs

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Objective: To report a technique for, and short-term outcome of unilateral laparoscopic adrenalectomy in dogs positioned in sternal recumbency without abdominal support.

Study Design: Experimental and prospective clinical study.

Animals: Healthy dogs (n = 5) and dogs with unilateral adrenal gland tumor (n = 9).

Methods: Anesthetized dogs were positioned in sternal recumbency with 2 cushions placed under the dog to elevate the chest and pelvic area so that the abdomen was not in contact with the surgical table allowing gravitational displacement of the abdominal viscera. Three 5-mm portals were located in the paralumbar fossa. Adrenal glands were carefully dissected and surrounding tissues sealed and cut using a vessel-sealing device. A retrieval bag or part of a surgical glove finger was used to remove the adrenal gland from the abdomen. Surgical time and complications were recorded, and short-term outcome assessed.

Results: Adrenal glands in normal dogs and unilateral adrenal tumors (8 left, 1 right) not involving the caudal vena cava in affected dogs were successfully removed laparoscopically. There were no major intraoperative complications. Of the dogs with adrenal tumors, 1 dog died within 24 hours of surgery from unrelated causes. Eight dogs recovered within 1 day and were discharged within 72 hours. Surgical times ranged from 42 to 117 minutes and were significantly shorter than those reported previously.

Conclusions: Positioning anesthetized dogs in sternal recumbency with the abdomen suspended to facilitate gravitational displacement of the abdominal viscera improves access to, and visibility of, the adrenal gland for laparoscopic removal.
Evaluation of Percutaneously Adjustable Hydraulic Urethral Sphincters With and Without Induced Mechanical Failure

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Objective: To describe (1) the radiographic appearance of intact hydraulic urethral sphincters (HUS) and (2) the success of leak detection using clinically feasible methods.

Study Design: Prospective, blinded in vitro study.

Sample Population: Thirty HUS devices (10 each of 8, 10, and 12mm diameter sizes).

Materials and Methods: All devices were inflated with saline (0.9% NaCl) solution to complete occlusion, inspected, and weighed over a 24-hour period for manufacturing defects. HUS phantoms were created to mimic surrounding soft tissues. One randomly selected HUS of each size was evaluated radiographically at different inflation volumes and angles. All HUS systems were then evaluated in random order before and after puncture with volumetry, manometry, radiography, and contrast fluoroscopy. Volumetry was the total volume (mL) retrieved from each HUS system. Manometry was the pressure (cm H2O) within each HUS system. The HUS devices were filled to a known volume before each measurement.

Results: When all HUS sizes were considered, volumetry did not reveal significant differences before and after puncture, but manometry was significantly different (P<0.01). Radiography was 63.8% sensitive and 88.3% specific for puncture diagnosis, with inter-observer agreement of 0.58. Contrast fluoroscopy was 78.4% sensitive and 100% specific, with inter-observer agreement of 0.97.

Conclusions: Of those methods tested, contrast fluoroscopy was the most sensitive, specific, and consistent method of leak detection. Manometry was also helpful, but may be difficult to use clinically. Volumetry and radiography were relatively poor indicators of leakage in this model. Veterinary Surgery 42 (2013) 774-782
Evaluation of Single Port Access Gastropexy and Ovariectomy Using Articulating Instruments and Angled Telescopes in Dogs

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Objective: To describe in dogs, a technique for single port access gastropexy and ovariectomy (SPAGO) using a commercially available multitrocar port and to evaluate short-term outcome.

Design: Retrospective case series.

Animals: Dogs (n = 18).

Procedures: A commercially available multitrocar port was inserted into the abdomen lateral to the rectus abdominis muscle and 2-5 cm caudal to the right rib. Dogs were tilted 45° in both left and right recumbency and bilateral ovariectomy performed using articulating graspers, a bipolar vessel sealing device and a 30° telescope. The laparoscopic assisted incisional gastropexy was performed after ovariectomy at the multitrocar port insertion site by grasping the antral portion of the stomach with a 10 mm DuVall forceps and suturing the seromuscular layer of the antral region of the stomach to the transversus abdominis muscle.

Results: Eighteen dogs (median weight, 34.5 kg; range, 14.7-59.2 kg) met the inclusion criteria. Median surgical time for SPAGO was 65 minutes (range, 50-225 minutes). Intraoperative complications included, incorrect multitrocar port placement location (n = 3) and mild hemorrhage from a splenic laceration (1). All dogs recovered from surgery and were discharged from the hospital.

Conclusions: Single port access gastropexy and ovariectomy is a feasible procedure to provide prophylaxis against gastric dilation-volvulus and a simultaneous means of sterilization in female dogs. Careful and accurate initial multitrocar port insertion is necessary to have optimal operative viewing as well as to reduce the chances of inadvertent splenic laceration. Veterinary Surgery 42 (2013) 807-813
Initial treatment factors
associated with feline urethral obstruction
recurrence rate: 192 cases (2004–2010)

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**Objective**—To evaluate the association of treatment factors during initial urinary catheterization (IUC) of cats with recurrence of urethral obstruction at 24 hours and 30 days after catheter removal.

**Design**—Retrospective case series.

**Animals**—192 male cats with urethral obstruction that were treated at an emergency and specialty center from 2004 through 2010.

**Procedures**—Data were obtained from the cats’ medical records. Duration of indwelling catheterization, catheterization with a 5F versus 3.5F urinary catheter, treatment with phenoxybenzamine versus prazosin, consistent administration of pain medication, and treatment with meloxicam or antimicrobials during IUC were reviewed for association with rate of recurrent urethral obstruction (rUO).

**Results**—Overall rUO rates were 10.94% (21/192 cats) at 24 hours and 23.57% (37/157 cats) at 30 days after IUC. At 24 hours and 30 days after IUC, rUO developed in 10 of 140 (7.14%) and 20 of 110 (18.18%) prazosin-treated cats, respectively, compared with 10 of 46 (21.74%) and 16 of 41 (39.02%) phenoxybenzamine-treated cats, respectively. Reobstruction developed following use of a 5F or 3.5F urinary catheter in 11 of 58 (18.97%) and 7 of 105 (6.67%) cats, respectively, through 24 hours. There was no association between rUO and duration of urinary catheterization, administration of antimicrobials or meloxicam, or consistent administration of pain medication during IUC.

**Conclusions and Clinical Relevance**—At 24 hours and 30 days after IUC, rUO rates in prazosin-treated cats were significantly lower than rates in phenoxybenzamine-treated cats. Reobstruction rate at 24 hours was significantly lower when a 3.5F versus 5F urinary catheter was used. (*J Am Vet Med Assoc* 2013;243:512–519)
Stereotactic body radiation therapy
for treatment of injection-site sarcomas
in cats: 11 cases (2008–2012)

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Objective—To evaluate outcomes of stereotactic body radiation therapy (SBRT) in cats with injection-site sarcomas (ISS) via assessment of local responses and recurrences, survival times, and complications.

Design—Retrospective case series.

Animals—11 cats with ISS.

Procedures—Medical records of cats that were treated with SBRT for ISS between June 2008 and July 2012 were reviewed; information on patient demographics (age, sex, and breed), oncological histories (including prior treatment and histologic grade), details of SBRT plans (tumor volume, treatment field sizes, and prescription), response to treatment (including toxicoses), progression-free intervals, and survival times were extracted.

Results—Acute radiation-associated toxicoses were infrequent and limited to mild, self-limiting dermatitis and colitis in 2 and 1 of the 11 cats, respectively. No late radiation-associated toxicoses were observed. The objective response rate was 8 of 11 cats; these patients either had a partial or complete response as determined on the basis of CT or physical examination findings. The median progression-free interval was 242 days, and the median overall survival time was 301 days; median follow-up time of censored subjects was 173 days.

Conclusions and Clinical Relevance—SBRT was completed in 3 to 5 days and was well tolerated when used to treat cats with ISS. Measurable tumor responses were achieved in most cats in this study. Stereotactic body radiation therapy provided a means for palliation of ISS; further investigation is required to determine whether SBRT is a valid treatment option for downstaging disease prior to definitive surgery. (J Am Vet Med Assoc 2013;243:526–531)
Evaluation of short-term outcome after lung lobectomy for resection of primary lung tumors via video-assisted thoracoscopic surgery or open thoracotomy in medium- to large-breed dogs

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Objective—To describe clinicopathologic features of dogs that underwent lung lobectomy for resection of primary lung tumors via video-assisted thoracoscopic surgery (VATS) or open thoracotomy (OT) and to compare short-term outcomes for dogs following these procedures.

Design—Retrospective cohort study.

Animals—46 medium- to large-breed dogs with primary lung tumors.

Procedures—Medical records of dogs that underwent a lung lobectomy via VATS (n = 22) or OT (24) for resection of primary lung tumors between 2004 and 2012 were reviewed. Dogs were included if they weighed > 10 kg (22 lb) and resection of a primary lung tumor was confirmed histologically. Tumor volumes were calculated from preoperative CT scans where available. Surgical time, completeness of excision, time in the ICU, indwelling thoracic drain time, postoperative and total hospitalization time, incidence of major complications, and short-term survival rate were evaluated.

Results—VATS was performed with a 3-port (n = 12) or 4-port (10) technique and 1-lung ventilation (22). In 2 of 22 (9%) dogs, VATS was converted to OT. All dogs survived to discharge from the hospital. There were no significant differences between the VATS and OT groups with regard to most variables. Surgery time was significantly longer for VATS than for OT (median, 120 vs 95 minutes, respectively).

Conclusions and Clinical Relevance—In medium- to large-breed dogs, short-term outcomes for dogs that underwent VATS for lung lobectomy were comparable to those of dogs that underwent OT. Further studies are required to evaluate the effects of surgical approach on indices of postoperative pain and long-term outcomes. (J Am Vet Med Assoc 2013;243:681–688)
Risk factors associated with survival in dogs

with nontonsillar oral squamous cell carcinoma:

31 cases (1990–2010)

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Objective—To identify risk factors associated with survival in dogs with nontonsillar oral squamous cell carcinoma (OSCC) that were and were not treated with curative-intent surgery.

Design—Retrospective case series.

Animals—31 dogs with OSCC.

Procedures—Medical records for dogs with OSCC that were not treated, or were treated with curative-intent surgery only between January 1990 and December 2010 were reviewed. For each dog, data regarding signalment, clinical stage, treatment, tumor recurrence, and survival time were obtained from the medical record, and archived biopsy specimens were evaluated to identify the histologic subtype of the tumor and extent of tumor-associated inflammation (TAI), perineural invasion (PNI), and lymphovascular invasion (LVI).

Results—Risk of death for the 21 dogs with OSCC that were surgically treated was decreased 91.4% (hazard ratio, 0.086; 95% confidence interval, 0.002 to 0.150), compared with that for the 10 dogs with OSCC that were not treated. The 1-year survival rate was 93.5% and 0% for dogs that were and were not surgically treated, respectively. Risk of death increased significantly with increasing TAI and increasing risk score (combination of TAI, PNI, and LVI). Tumor location, clinical stage, and histologic subtype were not associated with survival time.

Conclusions and Clinical Relevance—Results indicated that the prognosis for dogs with OSCC was excellent following surgical excision of the tumor. Risk of death increased with increasing TAI, and combining TAI, PNI, and LVI into a single risk score may be a useful prognostic indicator for dogs with OSCC. (J Am Vet Med Assoc 2013;243:696–702)
Evaluation of costs and time required for laparoscopic-assisted versus open cystotomy for urinary cystolith removal in dogs:

43 cases (2009–2012)

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Objective—To compare required time and costs of surgery and hospitalization as well as prevalence of incomplete urinary cystolith removal associated with laparoscopic-assisted cystotomy versus open cystotomy in dogs.

Design—Retrospective case series.

Animals—20 dogs with urolithiasis treated by laparoscopic-assisted cystotomy and 23 dogs treated by open cystotomy.

Procedures—Medical records were reviewed. Surgery cost, hospitalization cost, total cost, surgery time, days in hospital, incomplete cystolith removal, and number of doses of analgesic administered IV after surgery were compared between the laparoscopic-assisted cystotomy and open cystotomy groups.

Results—Surgery cost and total cost were significantly higher in the laparoscopic-assisted cystotomy group. Hospitalization cost, days in hospital, and prevalence of incomplete cystolith removal did not differ significantly between groups. Number of doses of analgesic was significantly lower in the laparoscopic-assisted cystotomy group.

Conclusions and Clinical Relevance—Laparoscopic-assisted cystotomy was more timeconsuming and expensive but associated with fewer postoperative doses of injectable analgesics, compared with open cystotomy. Laparoscopic-assisted cystotomy is an acceptable, more expensive, and minimally invasive alternative to open cystotomy for the removal of urinary cystoliths in dogs. (J Am Vet Med Assoc 2013;243:703–708)
Comparison of perioperative analgesic efficacy between methadone and butorphanol in cats

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Objective—To compare the perioperative analgesic effect between methadone and butorphanol in cats.

Design—Randomized controlled clinical trial.

Animals—22 healthy female domestic cats.

Procedures—Cats admitted for ovariohysterectomy were allocated to a butorphanol group (n = 10) or methadone group (12) and premedicated with butorphanol (0.4 mg/kg [0.18 mg/lb], SC) or methadone (0.6 mg/kg [0.27 mg/lb], SC), respectively, in combination with acepromazine (0.02 mg/kg [0.01 mg/lb], SC). Anesthesia was induced with propofol (IV) and maintained with isoflurane in oxygen. A multidimensional composite scale was used to conduct pain assessments prior to premedication and 5, 20, 60, 120, 180, 240, 300, and 360 minutes after extubation or until rescue analgesia was given. Groups were compared to evaluate isoflurane requirement, propofol requirement, pain scores, and requirement for rescue analgesia.

Results—Propofol and isoflurane requirements and preoperative pain scores were not different between groups. During recovery, dysphoria prevented pain evaluation at 5 minutes. Pain scores at 20 minutes were significantly lower in the methadone group, and 6 of 10 cats in the butorphanol group received rescue analgesia, making subsequent pain score comparisons inapplicable. After 6 hours, only 3 of 12 cats in the methadone group had received rescue analgesia.

Conclusions and Clinical Relevance—In the present study, methadone appeared to be a better postoperative analgesic than butorphanol and provided effective analgesia for 6 hours following ovariohysterectomy in most cats. (J Am Vet Med Assoc 2013;243:844–850)
Use of vacuum-assisted closure
to maintain viability of a skin flap in a dog

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Case Description—A 4-year-old sexually intact male Labrador Retriever–Poodle mix was admitted to the hospital for treatment of a wound in the left thoracic region. The wound had been debrided and primary closure had been performed by the referring veterinarian 4 days previously.

Clinical Findings—The dog had a 20-cm-long wound covered by a large flap of skin that extended caudally from the scapula over the left side of the thorax. A 3-cm defect was evident at the cranioventral aspect of the wound, from which purulent material was being discharged. The skin flap was necrotic, and the skin surrounding the flap was bruised. Signs of pain were elicited when the wound and surrounding region were palpated. Other findings, including those of thoracic radiography, were unremarkable.

Treatment and Outcome—The wound was debrided, and vacuum-assisted closure (VAC) was initiated for 3 days until a healthy bed of granulation tissue developed. A reconstructive procedure was performed with a rotation flap 3 days after VAC dressing removal. The VAC process was reinitiated 2 days following reconstruction because of an apparent failing of the skin flap viability. After 5 days of VAC, the flap had markedly improved in color and consistency and VAC was discontinued. Successful healing of the flap occurred without the need for debridement or additional intervention.

Clinical Relevance—Use of VAC led to a good overall outcome for the dog, with complete healing achieved. Additional evaluation of this technique for salvaging failing skin flaps is warranted in dogs, particularly considering that no reliable method for flap salvage in veterinary species has been reported to date. (J Am Vet Med Assoc 2013;243:863–868)
Evaluation of risk factors associated with recurrent obstruction in cats treated medically for urethral obstruction

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Objective—To determine risk factors for short-term recurrent urethral obstruction in cats after treatment by means of urinary catheterization and hospitalization.

Design—Prospective case series.

Animals—83 client-owned cats.

Procedures—Physical examination findings, laboratory abnormalities, treatment decisions, and environmental changes were evaluated as risk factors for recurrent urethral obstruction in the 30 days following hospital discharge.

Results—Of the 68 cats with completed follow-up surveys, 10 had an episode of recurrent urethral obstruction. Older cats were significantly more likely to have recurrent urethral obstruction. No specific laboratory abnormalities were associated with the risk of recurrent urethral obstruction. Longer duration of catheterization was significantly associated with a decreased risk of recurrent urethral obstruction. Duration of hospitalization and volume of IV fluids delivered were not significantly associated with recurrent urethral obstruction. Increasing water availability after discharge was associated with a decreased risk of recurrent urethral obstruction. There was no association between diet and recurrent urethral obstruction.

Conclusions and Clinical Relevance—Results of this study suggested that longer duration of catheterization may be associated with a lower probability of short-term recurrent urethral obstruction in male cats. Older cats were at higher risk for recurrent obstruction. Owners should be encouraged to increase water availability after discharge in cats treated for urethral obstruction to decrease the likelihood of recurrence. (J Am Vet Med Assoc 2013;243:1140–1146)
Morphology of congenital portosystemic shunts emanating from the left gastric vein in dogs and cats

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**OBJECTIVE:** To describe the anatomy of congenital portosystemic shunts emanating from the left gastric vein in dogs and cats.

**METHODS:** A retrospective review of a consecutive series of dogs and cats managed for congenital portosystemic shunts.

**RESULTS:** Forty-six dogs and 27 cats met the inclusion criteria of a congenital portosystemic shunt emanating from the left gastric vein. Of the 46 dogs, 28 (61%) had a shunt that entered the left phrenic vein, 10 (22%) had a shunt that entered the post hepatic caudal vena cava and in 8 (17%) the shunt entered the azygos vein. Of the 27 cats, 19 (70%) had a shunt that entered the left phrenic vein and 8 (30%) had a shunt that entered the post hepatic caudal vena cava.

**CLINICAL SIGNIFICANCE:** The systemic vein into which the shunt entered was consistent showing three common presentations: left gastro-phrenic, left gastro-caval and left gastro-azygos. This information may help with surgical planning in cases undergoing shunt closure surgery. Journal of Small Animal Practice (2013) 54, 459–467
Sonographic features of gastrointestinal lymphoma in 15 dogs

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OBJECTIVES: The purpose of this study is to describe the sonographic appearance of lymphoma of the gastrointestinal tract in dogs.

METHOD: A retrospective review was conducted and patients with gastrointestinal lymphoma diagnosed by histopathology (including immunohistochemistry, where available) or cytology that had an abdominal ultrasound were included.

RESULTS: Four of 15 (26.7%) cases with histopathologically confirmed lymphoma exhibited no sonographic abnormalities. In the dogs with sonographic abnormalities, features including intestinal wall thickness and the presence or absence of wall layering were highly variable. Clinical signs pertaining to the gastrointestinal tract were also unreliable markers of gastrointestinal lymphoma, with weight loss, vomiting, and diarrhoea being uncommon presenting complaints; intestinal obstruction was not present in any patient.

Use of negative contrast computed tomography for diagnosis of a colonic duplication in a dog

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A 24-week-old dog was presented with recurrent rectal prolapse because of colonic duplication. Colonic duplication is an extremely uncommon congenital abnormality, with only six cases reported in veterinary medicine, one diagnosed at necropsy and five after barium enema, colonoscopy, abdominal ultrasound, exploratory laparotomy either alone or in combination. In this case, these techniques failed to identify the abnormality and diagnosis was ultimately achieved via negative contrast computed tomography. The evaluation generated by the computed tomography images allowed a refined surgical approach. To the authors' knowledge, negative contrast computed tomography has not yet been reported in the veterinary literature to diagnose gastrointestinal pathologies. Colonic duplication in this case was treated by removal of the intercolonic septum via colotomy. Journal of Small Animal Practice (2013) 54, 547–550
Pulmonary lipoma in a dog

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An eight-year-old, neutered, male German short-haired pointer was presented for a chronic cough and an intrathoracic mass. Computed tomography revealed a mass with low attenuation in the right caudal lung lobe that invaded the principal bronchi. The mass was removed by right caudal and accessory lung lobectomy. The histopathological diagnosis was pulmonary lipoma. The clinical signs resolved following surgery. There was no evidence of recurrence or de novo lesions on computed tomography performed 12 months post-surgery. To the authors’ knowledge, this is the first report of a pulmonary lipoma in a dog. Journal of Small Animal Practice (2013) 54, 555–558