Oviduct Detachment During Egg-laying in a Loggerhead Turtle

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Greece hosts the largest nesting aggregations of loggerhead turtles in the Mediterranean (Casale et al. 2018). One of the most important nesting sites is the southern Kyparissia Bay in the western Peloponnese. This area has been monitored systematically by ARCHELON, since 1984 (Margaritoulis & Rees 2001). Monitoring work is conducted by trained volunteers, supervised by experienced field assistants, who survey the nesting beaches in the morning during the loggerhead's reproduction season from early May until the end of September. The volunteers walk the beaches and record all nesting and hatching activity that took place the previous night. When a nest is found, volunteers hand-excavate the nesting spoor to locate the egg-chamber and place a flat metal grid above it as a protection measure against predation by mammals. All marked nests are monitored regularly during incubation until they hatch. The first appearance of hatchlings from a nest signals the end of the incubation period of this nest. After about 10 days from its hatch, the nest is excavated to determine various reproductive parameters, such as clutch size and hatching success.

Here, we report on the case of a female loggerhead turtle whose oviduct was detached during the egg laying process, as this was evidenced from the morning survey observation.

During the morning survey of 2 June 2021, the volunteer team on duty located a nesting female's tracks which initially appeared to be normal, consisting of an upward track, a camouflage and a downward track. However, upon following the downward track, traces of blood were observed. During the procedure of locating the egg-chamber, a piece of the turtle's oviduct was found beneath the top layer of sand, which eventually ran into the egg-chamber where more oviduct pieces and blood clots were found (Fig. 1). Presumably, the oviduct was cut into several pieces by the turtle's nest-covering movements. The oviduct's colouration appeared purplish with increased vascularity at its wider part (Fig. 2). All pieces were collected and stored in a freezer for two days. When defrosted they were washed and measured (Fig. 3). The total length of the oviduct was 6.5 m and it was cut into eight pieces with the two longest sections totalling 4.8 m. The oviduct's width at the distant ends of the two longest sections ranged from a few millimetres to 3.6 cm. A shorter -34 cm-section had a maximum width of 5.0 cm, and when cut open had a flattened width of 12.0 cm. The blood clots varied in length from 2.0 to 13.0 cm. All clots were found outside the oviduct tube, apart from one which measured 5.1 cm.

The nest was made 27 m from the sea and the top egg was found at 29 cm from the sand surface. The clutch did not appear to have been affected by blood or tissue. We reinforced the standard nest protection by adding perpendicular metal grids in all sides of the nest to deter predators that would be attracted by the oviduct's smell. As a result, the nest was not predated during the 54 days of incubation. Post-hatch excavation revealed an extremely low hatching success (17.6%), since only nine out of 51 eggs hatched. Among the 51 eggs were three conjoined (two triple and one double) eggs. Additionally, four yolkless and six mini eggs were found which were not included in the calculation of the clutch size (*senso* Miller 1999).

Figure 1. The detached oviduct after extraction from the egg-chamber; blood clots shown at the lower part of the picture.

To our knowledge, the herein reported case is the first documentation of such incident in the Mediterranean. During our global literature search, we found four cases in Mexico involving olive ridleys (1989-2011; Saracho et al. 2013), one case in North Carolina (1997) and two cases in Florida (2001) involving loggerheads (Nutter et al. 2000; Frutchey et al. 2003), as well as one case in Texas (2019) involving a green turtle (Frandsen et al. 2020).

From these eight turtles, oviduct detachment was directly observed during oviposition in only two cases. The first case was the green turtle in Texas, which was observed as having a prolapsed and partially detached oviduct. The turtle was found dead shortly after and a necropsy revealed that the remaining fragments of the detached oviduct induced a severe infection, which weakened the female, and resulted in its drowning (Frandsen et al. 2020). The second case was with the loggerhead turtle in North Carolina, which was observed expelling her oviduct during oviposition, and she was taken for treatment. The exposed oviduct was removed, through hemiovariosalpingectomy, while the second unaffected oviduct was left intact. This treatment was highly successful as the turtle, which was released after about 3 months of rehabilitation, was recorded after two years making a nest with a high hatching success (Nutter et al. 2000).

Figure 2. Close up of the detached oviduct showing characteristic vascularization at its widest part.

These two cases indicate that while an untreated detached oviduct can be lethal, a successful treatment is possible without total loss of the turtle's reproductive capability. Unfortunately, in our case it was not possible to determine the fate of the turtle as no stranded turtle, associated with this event, was recorded in the following weeks in the wider area.

Figure 3. After defrosting, all oviduct parts and blood clots were carefully washed and measured.

Most likely, oviduct detachment is directly linked to untreated oviduct prolapse. Oviduct prolapses are generally more common to occur in chelonians and lizards than in other reptiles (Hedley & Eatwell 2014). It appears also to be associated with a variety of conditions such as dystocia, gastrointestinal parasites, calcium deficiency, urolithiasis and trauma (Raiti 1995; Divers & Stahl 2006). Furthermore, oviduct prolapse could be the result of egg binding or any other tenesmus conditions (Divers & Stahl 2006; Hedley & Eatwell 2014). The very low hatching success of the herein reported case, as well as the presence of conjoined eggs, indicate that dystocia could be the possible cause, which is a condition often associated with the female laying infertile eggs and it occurs often in first time breeders (Divers & Stahl 2006).

Reporting such rare observations is of importance for a better understanding of reproduction abnormalities, as well as for the effect that those incidents may have on the breeding capability and the survival of sea turtles.

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